2016 PROGRAM

Controlled Release Society Annual Meeting & Exposition
July 17–20, 2016 • Seattle, Washington, U.S.A.

#CRSseattle

controlledreleasesociety.org/meeting
Access the Meeting Anytime, Anywhere

2016 CRS Meeting App

- Program Guide
- Abstracts
- Appointment Maker
- Exposition
- Personal Schedule & To-do List
- Local Seattle Attractions, Restaurants & More!

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Search “CRS Meeting” in your app store.

WiFi access in the convention center:
Username: CRS2016
Password: science1
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## 2016 Annual Meeting Program Committee

Thank you to this year's Annual Meeting Program Committee for their time and talents in planning this outstanding program.

### Chair
Kinam Park  
Purdue University, U.S.A.

### Deputy Chair
Christine Allen  
University of Toronto, Canada

### Team Members

- **Chair**  
  Kinam Park  
Purdue University, U.S.A.

- **Deputy Chair**  
  Christine Allen  
  University of Toronto, Canada

- **Chair**  
  Samir Mitragotri  
  University of California, U.S.A.

- **Deputy Chair**  
  Claudio Ortiz  
  Colgate Palmolive, U.S.A.

- **Chair**  
  In-San Kim  
  KIST, Korea

- **Chair**  
  Mark Tracy  
  Tracy BioConsulting, LLC, U.S.A.

- **Chair**  
  Hong Wen  
  FDA, U.S.A.

- **Chair**  
  Jennifer Wong  
  University of Sydney, Australia

- **Chair**  
  Yoon Yeo  
  Purdue University, U.S.A.
General Meeting Information

Share Your Photos & Experiences

#CRSseattle  

Registration
The CRS Central and self-serve kiosks are located in the Atrium Lobby on Level 4. You can modify your registration and print your badges at the self-serve kiosks. Name badges can only be printed at the kiosk one time. CRS staff will be available at the CRS Central.

*Your CRS name badge must be worn at all times in the convention center and at all scheduled CRS events.*

Access the Abstracts
CRS Annual Meeting abstracts can easily be accessed using the CRS Meeting App and the CRS website. Within the app, click on the Presenters icon to view abstracts. Sign into the CRS website to view and search the abstracts, available to all registered attendees.

Exposition Location
The Exposition is located in Room 4AB on Level 4. The detailed schedule of Exposition activities can be found via the CRS Meeting App.

Poster Sessions
The posters are located in the Exhibit Hall, Room 4AB on Level 4. Details on when poster authors will be present can be found via the CRS Meeting App. All posters must be removed during Poster Take-Down or they will be removed and discarded. The poster viewing area will be secured overnight. Photographing posters is not permitted.

Speaker Preparation Room
The Speaker Preparation Room is located in Room 303 on Level 3 and is available for PowerPoint previewing and uploading presentation materials. Speakers are to upload presentations one day prior to their presentation date (e.g., if you speak on Monday, July 18, you will upload your presentation on Sunday, July 17). Presenters are not allowed to use their own laptops to give their presentations. Detailed hours of when the Speaker Ready Room is open can be found in the CRS Meeting App.

Electronic Devices
As a courtesy to other meeting attendees, please turn off or silence all electronic devices during all presentations.

Photography
Photography is not permitted in the session rooms, exhibit hall, or poster sessions.

Photo Release
By virtue of your attendance, you agree to the Controlled Release Society’s use of your likeness in promotional media.

Children and the CRS Annual Meeting & Exposition
The CRS Annual Meeting & Exposition is a professional, scientific meeting. CRS does not permit children under the age of 18 to attend the scientific sessions, poster sessions, exposition, and social events. For safety reasons, only registered exhibitors and poster presenters are permitted in the exposition/poster hall during set-up and take-down hours. Children 18+ must register and buy applicable individual tickets if not attending/registering as a student.
Washington State Convention Center – Level Four
Exhibit Halls
102 O’Hara Technologies Inc.
104 Springer
105 Agilent Technologies
106 Elsevier
107 Quotient Clinical
113 PharmaCircle LLC
204 Certara
205 Patheon
207 Anton Paar USA
208 Advanced Polymer Materials Inc.
209 ProMed Pharma LLC
210 ISPG, Inc.
211 Sirius Analytical, Inc.
212 CordenPharma
213 Oakwood Labs
304 PolyMicrospheres-Advanced Nanotech
305 Malvern Instruments
306 FlackTek, Inc.
307 Simulations Plus, Inc.
308 Freund-Vector Corp.
309 MedPharm
310 Shin-Etsu Chemical Co., Ltd.
311 Sunovis Life Sciences Limited
312 Hanso Research Corp.
313 Corbion Purac Biomaterials
404 Evonik Corporation
405 Gattefossé
406 Avanti Polar Lipids, Inc.
407 SOTAX
408 Wyatt Technology Corporation
409 Celanese
410 Southwest Research Institute
411 MilliporeSigma
412 Catalent Pharma Solutions
413 DURECT Corporation/Lactel Absorbable Polymers
504 Capsugel
505 Lipoid, LLC
506 Akina, Inc.: PolySciTech Division
507 Polymun Scientific Immunobiologische Forschung GmbH
508 LCI Corporation
509 Gaylord Chemical Company
510 NanolImaging Services, Inc.
511 Texture Technologies Corp.
512 Colorcon
513 Precision NanoSystems Inc.
604 TRANSFERRA Nanosciences Inc.
605 InSitu Biologics
606 IMA North America, Inc.
607/609 Fuji Health Science, Inc.
608 Logan Instruments Corp.
610 Ashland Inc.
611 NOF Corporation
612 Spraybase
613 Microfluidics International Corporation
701 LTS Lohmann Therapy Systems
703 Taylor & Francis Group
704 Adhesives Research/ARx, LLC
705 Pantec Biosolutions AG
706 EumulTech b.v.
707 Absorption Systems
709 Mikron Automation
712 3M Drug Delivery Systems

As of June 20, 2016
Saturday, July 16

Schedule-at-a-Glance
8:00 a.m. – 12:00 p.m.  CRS Board of Directors Meeting • Westin Hotel, Puget Sound
8:00 a.m. – 5:00 p.m.  Exposition Set-Up • Room 4AB
11:30 a.m. – 5:00 p.m.  CRS Registration Open • Atrium Lobby, Level 4
11:30 a.m. – 5:00 p.m.  Speaker Preparation Room Open • Room 303

Program Highlights

Premeeting Workshop*
Regulatory Landscape of Complex Drug Products*
8:30 a.m. – 5:00 p.m. • Room 608–609

Young Scientist Programming
Young Scientist Professional Development Workshop:
Finding Your Career Edge
12:30 – 5:00 p.m. • Room 611–612

Young Scientist Speed Mentoring Event
5:00 – 6:00 p.m. • Room 604

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Sunday, July 17

Schedule-at-a-Glance
7:30 a.m. – 5:00 p.m.  Speaker Preparation Room Open • Room 303
7:30 a.m. – 6:30 p.m.  CRS Registration Open • Atrium Lobby, Level 4
8:00 a.m. – 1:00 p.m.  Scientific Program
8:00 a.m. – 2:00 p.m.  Exposition and Poster Set-Up • Room 4AB
9:00 a.m. – 1:00 p.m.  Technology Forums
1:30 – 2:00 p.m.  Opening Session and Award Ceremony • Room 6B
2:00 – 2:45 p.m.  CRS Founders Award Lecture - Hans Junginger • Room 6B
2:00 – 4:30 p.m.  Scientific Program
4:30 – 6:30 p.m.  Exposition Grand Opening & Reception with Poster Viewing • Room 4AB

Program Highlights

Premeeting Workshops
Innovative Formulation Approaches to Improve Early Stage Development*
*Sponsored by Catalent Pharma Solutions
8:00 a.m. – 1:00 p.m. • Room 608–609

Young Scientist Programming
Protecting Your Innovation: A Joint VOLD-YSC Workshop on Key Concepts of Intellectual Property
9:00 a.m. – 12:00 p.m. • Room 611–612

Young Scientist Meet & Greet – NEW!
12:00 – 1:00 p.m. • Room 611–612

CRS Founders Award Lecture
Forks of Crossroads – or – Failures and Successes in a Scientific Life
2:00 – 2:45 p.m. • Room 6B

Hans Junginger
Retired Leiden University, Germany
Moderator: Alexander Florence

Industry Roundtable
Drug Delivery in the Context of Global Health
*Sponsored by Pfizer
3:00 – 4:30 p.m. • Room 6A

Other Program Highlights
First Timers’ Meeting
1:00 – 1:30 p.m. • Room 6A

Opening Session and Awards Ceremony
1:30 – 2:00 p.m. • Room 6B

Exposition Grand Opening and Welcome Reception
4:30 – 6:30 p.m. • Room 4AB

Young Scientist Networking Event*
9:00 – 11:00 p.m. • Rhein Haus (offsite)

*Additional registration, payment, and ticket required
Innovative Research. Meaningful Connections.

Advance your career by joining the premier global delivery science network. Connect with resources and collaborators to move your work to the next level!

Begin Today!

controlledreleasesociety.org

CRS
Leading Delivery Science and Technology
Technology Forums – Sunday, July 17

These forums are open to all registered attendees on a complimentary basis, offering in-depth coverage of delivery and release technologies and services, hosted by the following companies. Detailed descriptions of the individual forums can be found on the CRS Meeting App.

**Fuji Chemical Industries Co., Ltd.**

The Use of Inorganic Excipients for the Development of Oral Solid Dosage Forms by Means of Extrusion Processes
9:00 – 10:00 a.m. • Room 605

**Agilent Technologies**

Tools of the Trade: Agilent 280-DS and Enhanced Mechanical Qualification of the Dissolution Apparatus
9:00 – 10:00 a.m. • Room 610

**Evonik Industries**

Debunking the Myths of Complex PLG Formulations
9:00 – 10:00 a.m. • Room 613

**Wyatt Technology**

The Light Scattering Toolkit for Characterization and Formulation of Drug Delivery Nanoparticles
9:00 – 10:00 a.m. • Room 614

**Sotax**

A Novel Method for the Elution of Sirolimus (Rapamycin) in a Drug-Eluting Device
10:30 – 11:30 a.m. • Room 605

**Suven Life Sciences**

Preclinical Pharmacokinetic Services for Formulation Development of 505(b)(2) and ANDA Products
10:30 – 11:30 a.m. • Room 610

**Eudratec**

EUDRATeC® – Innovative Formulation Technologies for Advanced Drug Delivery
10:30 – 11:30 a.m. • Room 613

**Colorcon**

Approaches to Taste Masking of Particles for Oral Application and Examination of a Novel Biorelevant Dissolution Testing Methodology
10:30 – 11:30 a.m. • Room 614

**Cambridge Design Partnership**

Smarter Combination Products: Development Strategies to Reduce Risk and Shorten Time to Launch
12:00 – 1:00 p.m. • Room 605

**NCL Nanotechnology Characterization Laboratory**

Nanoparticle Characterization and Reformulation Opportunities
12:00 – 1:00 p.m. • Room 610

**EmulTech**

Development and Manufacturing of Sustained Release Microspheres Using Microfluidic Encapsulation
12:00 – 1:00 p.m. • Room 613

**Grunenthal**

INTAC – A Versatile Hot-Melt Extrusion Platform to Create Outstanding Product Performance
12:00 – 1:00 p.m. • Room 614
### Scientific Program • Monday 8:30 – 10:00 a.m.

<table>
<thead>
<tr>
<th>Room 608–609</th>
<th>Room 611–614</th>
<th>Room 6B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery Technologies in Cosmetics, Personal Care, and Household Products</strong></td>
<td><strong>Integration of Imaging and Drug Delivery</strong></td>
<td><strong>Oral Delivery</strong></td>
</tr>
<tr>
<td><strong>Moderator:</strong> Ron Veršič</td>
<td><strong>Moderator:</strong> Ick Chan Kwon</td>
<td><strong>Moderator:</strong> Cornell Stamoran</td>
</tr>
<tr>
<td><strong>Session Chairs:</strong> Claudio Ortiz and Fanwen Zeng</td>
<td><strong>Session Chairs:</strong> Michael Dunne and Twan Lammers</td>
<td><strong>Session Chairs:</strong> Hong Wen and Yan Wang</td>
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#### Invited Speaker
8:35 AM 2
Bijel capsules – a novel architecture for simultaneous delivery of hydrophilic and hydrophobic materials
**Job Thijssen,** The University of Edinburgh, United Kingdom

#### Research Highlight Talks

**Room 608–609**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</thead>
</table>
| 9:15 AM | Engineering Chitosan-Calcium Tripolyphosphate Composite Microparticles: From Core/Shell to Coated Matrix and Coated Reservoir Microencapsulation System
Fideline Tchuenbou-Magaia, University of Birmingham, United Kingdom |
| 9:23 AM | Amine-modification of Silica Nanoparticles Reduces Lung Inflammation in Mice
Angie Morris, University of Iowa, U.S.A. |
| 9:31 AM | Rheological Characterization and In Vitro Permeation of Menthol Gels for Topical Application
Mahima Manian, Mercer University, U.S.A. |
| 9:39 AM | Evaluation of in vitro evaporation profile of a natural insect repellent (citronella oil) impregnate in mesoporous silica
Nestor Mendoza Munoz, University of Colima, Mexico |
| 9:47 AM | The Effect of Aldehydes on Polyurea Encapsulated Fragrance for Consumer Products
Timothy Evans-Lora, Symrise Inc., U.S.A. |

**Room 611–614**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</thead>
</table>
| 9:15 AM | Monitoring disposition of lipid-based formulations for sustained release using X-ray CT imaging
Ben Boyd, Monash University, Australia |
| 9:23 AM | Real-Time Volumetric Imaging of Nanoparticle Transport in the Rat Cortex
Justin Rosch, Cornell University, U.S.A. |
| 9:31 AM | Dual-Targeting Immunoliposomes Conjugated with Anti-CD133 mAb and Angiopep-2 for GSCs
Jung Seok Kim, Sookmyung Women’s University, South Korea |
| 9:39 AM | Augmenting drug-carrier compatibility improves tumor nanotherapy efficacy
Yiming Zhao, Icahn School of Medicine at Mount Sinai, U.S.A. |
| 9:47 AM | A Nanomedicine Biodegradable Platform for Image-Guided Surgery and Intraoperative Phototherapy for Ovarian Cancer Treatment
Oleh Taratula, Oregon State University, U.S.A. |

**Room 6B**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</thead>
</table>
| 9:08 AM | Development of a gastro-resistant (GR) formulation of a weak acid drug and evaluation of its pharmacokinetic (PK) impact
Pedro Barrocas, BIAL - Portela & Co., S.A., Portugal |
| 9:16 AM | Application of Fused Deposition Modeling (FDM) 3D printing in the fabrication of pharmaceutical oral solid dispersions for the delivery of poorly soluble drugs
Sheng Qi, University of East Anglia, United Kingdom |
| 9:32 AM | Combining Lipophilic Prodrugs and Lipid Based Nanomedicine to Convert Injectable to Oral Chemotherapy
Clive Prestidge, University of South Australia, Australia |

#### Invited Speaker
8:35 AM 5
Current and future opportunities for image-guided nanotherapy
**Katherine Ferrara,** University of California-Davis, U.S.A.

#### Research Highlight Talks

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 9:08 AM | ROS-scavenging Nanoparticle Increases Chemotherapeutic Effect with Reducing Gastrointestinal Toxicity of Conventional Drugs
Binh Long Vong, University of Tsukuba, Japan |
| 9:16 AM | Development of a gastro-resistant (GR) formulation of a weak acid drug and evaluation of its pharmacokinetic (PK) impact
Pedro Barrocas, BIAL - Portela & Co., S.A., Portugal |
| 9:24 AM | Application of Fused Deposition Modeling (FDM) 3D printing in the fabrication of pharmaceutical oral solid dispersions for the delivery of poorly soluble drugs
Sheng Qi, University of East Anglia, United Kingdom |
| 9:32 AM | Combining Lipophilic Prodrugs and Lipid Based Nanomedicine to Convert Injectable to Oral Chemotherapy
Clive Prestidge, University of South Australia, Australia |
Monday, July 18 – Morning

Schedule-at-a-Glance
7:30 a.m. – 6:30 p.m.  
CRS Registration Open • Atrium Lobby, Level 4
8:00 a.m. – 5:00 p.m.  
Speaker Preparation Room Open • Room 303
8:30 – 10:00 a.m.  
Scientific Program
10:15 – 11:15 a.m.  
Plenary Session • Room 6B
11:15 a.m. – 1:00 p.m.  
Exposition and Poster Session – Lunch included – NEW!
12:00 – 12:30 p.m.  
Even Numbered Poster Authors Present
12:30 – 1:00 p.m.  
Odd Numbered Poster Authors Present

Program Highlights

Industry Roundtables
Enabling Patient Centric Products through Drug Delivery Technologies  
Sponsored by MedImmune  
8:30 – 10:00 a.m. • Room 6A

Plenary Session
Dr. Allan Hoffman and the Allan Hoffman Student Travel Grant awardees will be recognized in this session.

Application of Controlled Release and Drug Delivery Technology to Address Global Health Needs  
10:15 – 11:15 a.m. • Room 6B

Susan Hershenson  
The Bill and Melinda Gates Foundation, U.S.A.  
Moderator: Vince Lee
### Scientific Program • Monday 1:15 – 2:45 p.m.

<table>
<thead>
<tr>
<th>Room 611–614</th>
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</thead>
<tbody>
<tr>
<td><strong>Manufacture, Characterization, Stability, and Regulatory Aspects</strong></td>
</tr>
<tr>
<td><strong>Moderator:</strong> Ruth Schmid</td>
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<tr>
<td><strong>Session Chairs:</strong> Craig Bunt and Nicole Papen-Botterhuis</td>
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<tr>
<th>Room 6B</th>
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<tbody>
<tr>
<td><strong>Parenteral Systemic Delivery of Biopharmaceuticals: Overcoming Product Development and Regulatory Challenges</strong></td>
</tr>
<tr>
<td><strong>Moderator:</strong> Emmanuel Ho</td>
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<tr>
<td><strong>Session Chairs:</strong> Stephanie Choi and David Chen</td>
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<th>608–609</th>
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<tr>
<td><strong>Developing Therapeutic Options for Combating Cancer: A “One Health” Challenge for Humans and Dogs Mini Symposium</strong></td>
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<tr>
<td><strong>Sponsored by zoetis</strong></td>
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<tr>
<td><strong>Moderator:</strong> Marilyn Martinez</td>
</tr>
<tr>
<td><strong>Session Chair:</strong> David Brayden</td>
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</tbody>
</table>

#### Invited Speakers

**Room 611–614**

1:20 PM  
High-throughput synthesis and characterization of microcapsules  
**Johan Paul**, Flamac, a division of SIM, Belgium

1:45 PM  
Characterization of the Mechanical Strength, Adhesion and Leakage of Microcapsules for Developing Consumer Products  
**Zhibing Zhang**, University of Birmingham, United Kingdom

1:52 PM  
Transferring the State-of-the-Art for Manufacturing Biotherapeutics: Increasing quality and affordability for a global market  
**Bruce Kerwin**, Just Biotherapeutics, U.S.A.

2:10 PM  
Challenges with High Concentration Protein Solutions: Viscosity, Delivery of Large Volumes, and Device Considerations  
**William Lambert**, Omeros, U.S.A.

#### Research Highlight Talks

**Room 611–614**

2:10 PM  
A scalable microfluidics platform for the development of lipid nanoparticles  
**Ray Lockard**, Precision NanoSystems, Inc., Canada

2:18 PM  
The effect of manufacturing process on critical quality attributes of naltrexone microspheres  
**Janki Andhariya**, University of Connecticut, U.S.A.

2:26 PM  
Print-Drying: Monodisperse Droplet-Spray-Drying & High Quality Powder Production  
**Joris Salari**, TNO, The Netherlands

2:34 PM  
Physical Characteristics of Non-Ionic Surfactant Vesicles Prepared Using Different Manufacturing Methods  
**Mohammad Obeid**, University of Strathclyde, United Kingdom

**Room 6B**

2:10 PM  
PRINT: A protein bioconjugation method with exquisite N-terminal specificity  
**Surojit Sur**, Johns Hopkins Kimmel Cancer Center, U.S.A.

2:18 PM  
A Novel Microfabricated Drug Delivery Platform with Pulsatile Release Kinetics  
**Kevin McHugh**, Massachusetts Institute of Technology, U.S.A.

2:26 PM  
Chemistry, Manufacturing, and Control Deficiencies in Liposomal Drug Product Submissions  
**Mamta Kapoor**, US Food and Drug Administration, U.S.A.

2:34 PM  
Ex-Vivo Intraocular Model to Investigate Long-Term Protein stability in the Vitreous Humor  
**Sulabh Patel**, Pharmaceutical, F. Hoffmann-La Roche Ltd, Switzerland

#### Invited Speakers

**Room 6B**

2:34 PM  
Abstract not available  
**Thomas Andresen**, Technical University of Denmark, Denmark

The One Health concept is based upon an appreciation of the inextricable link between animal and human health (www.onehealthinitiative.com). This initiative has revitalized the parallel development of therapeutics and delivery systems for the treatment of diseases common to humans and animals. The Preclinical Sciences & Animal Health Division will conclude a One Health year-long initiative in the CRS Newsletter with a mini-symposium with renowned speakers.

**Invited Speakers**

1:15 PM  
Defining the Value of Comparative Oncology: The NCI Comparative Oncology Program and Companion Species Clinical Trials  
**David Vail**, University of Wisconsin-Madison, U.S.A.

2:15 PM  
Abstract not available  
**Thomas Andresen**, Technical University of Denmark, Denmark
Join the discussion on solutions across a number of formulation technologies with topics to include oral controlled release capabilities and softgel controlled release capabilities.

**Monday, July 18 – Afternoon**

**Schedule-At-A-Glance**

1:15 – 2:45 p.m.  Scientific Sessions Program
1:15 – 2:45 p.m.  Poster Viewing (authors not present)
3:00 – 4:00 p.m.  Exposition and Poster Session – Authors Present
3:00 – 3:30 p.m.  Odd Numbered Poster Authors Present
3:30 – 4:00 p.m.  Even Numbered Poster Authors Present
4:00 – 5:00 p.m.  Research Highlight Talk Sessions – **NEW!**
4:00 – 5:00 p.m.  Preclinical Sciences & Animal Health (PSAH) Division Meeting • Room 606
5:15 – 6:30 p.m.  Exposition and Poster Pub – **NEW!**
8:00 – 9:30 p.m.  Preclinical Sciences & Animal Health Networking Event*

**Program Highlights**

**Preclinical Sciences & Animal Health (PSAH) Mini-Symposium**

**Developing Therapeutic Options for Combatting Cancer: A “One Health” Challenge for Humans and Dogs**  
*Sponsored by Zoetis, LLC*  
1:15 – 2:45 p.m. • Room 608–609

**Industry Roundtable**

**Improving Complex Oral Development – New Modified Release Technologies and Accelerated Development Programs**  
*Sponsored by Catalent Pharma Solutions*  
1:15 – 2:45 p.m. • Room 6A

**Small Company Session**

**Emerging Companies and Technologies**  
4:00 – 5:00 p.m. • Room 6A

**Other Highlighted Events**

**Poster Pub – ****NEW!**  
*Sponsored by Akina, Inc: Poly Sci Tech Division*  
5:15 – 6:30 p.m. • Room 4AB

*Awards for the Graduate Research Advances in Delivery Science (GRADS), sponsored by Merck, will be announced during the Poster Pub.*

**Preclinical Sciences & Animal Health (PSAH) Networking Event**  
8:00 – 9:30 p.m. • Kells Irish Pub (offsite)

*Additional registration, payment, and ticket required

**Poster Pub**

*Sponsored by PolySciTech®*

**Monday, July 18**

Connect with poster presenters on the latest techniques, breakthroughs, and applications in delivery science—All over your favorite drink!
**Research Highlight Talk Sessions • Monday 4:00 – 5:00 p.m.**

<table>
<thead>
<tr>
<th>Room 6B</th>
<th>Room 611–614</th>
<th>Room 608–609</th>
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<tbody>
<tr>
<td><strong>Group A</strong></td>
<td><strong>Group B</strong></td>
<td><strong>Group C</strong></td>
</tr>
<tr>
<td>Includes the following session categories: Physical Oncology, Integration of Imaging and Drug Delivery, and Parenteral Systemic Delivery of Biopharmaceuticals</td>
<td>Includes the following session categories: Oral Delivery and Local Drug Delivery</td>
<td>Includes the following session categories: Taking Stock of Progress and Challenges in Drug Delivery and Targeting; “Thinking Outside the Box” Delivery Technologies: Nanocarriers from Nature; and Tissue Engineering</td>
</tr>
<tr>
<td><strong>Session Chair:</strong> David Peeler</td>
<td><strong>Session Chairs:</strong> Daniel Bar-Shalom and Tony Listro</td>
<td><strong>Session Chairs:</strong> Gerrit Borchard and Gary Liu</td>
</tr>
<tr>
<td>4:04 PM 483</td>
<td>4:04 PM 332</td>
<td>4:04 PM 574</td>
</tr>
<tr>
<td>Liposomes Reloaded: A novel strategy for loading “unloadable” drugs into stealth liposomes</td>
<td>Development of injection-molded capsular devices for pulsatile and colonic delivery through the application of fused deposition modeling (FDM) 3D printing</td>
<td>Cancerous SKOV-3 Exosomes Can Be Detected by Using Specific LXY30 Targeting Peptide</td>
</tr>
<tr>
<td>Surojit Sur, Johns Hopkins Medical Institutions, U.S.A.</td>
<td>Alice Melocchi, Università degli studi di Milano, Italy</td>
<td>Taturo Rojalmin, University of Helsinki, Finland</td>
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<tr>
<td>4:11 PM 541</td>
<td>4:11 PM 334</td>
<td>4:11 PM 581</td>
</tr>
<tr>
<td>Hyperthermia-induced Triggered Release of cisplatin from Thermosensitive Liposomes and Changes in Tumor Microenvironment in Non-Small Cell Lung Carcinoma</td>
<td>New Approaches on SNEDDS Dosing Regimens: In Vitro and In Vivo Evaluations</td>
<td>CD44-Targeted Calcium Phosphate Nanoparticles for Anticancer Drug Delivery</td>
</tr>
<tr>
<td>Yannan Nancy Dou, University of Toronto, Canada</td>
<td>Scheyla Siqueira, University of Copenhagen, Denmark</td>
<td>Min Sung Suh, University of Connecticut, U.S.A.</td>
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<tr>
<td>4:18 PM 132</td>
<td>4:18 PM 378</td>
<td>4:18 PM 582</td>
</tr>
<tr>
<td>Investigating tumor cell specificity of a nanoparticle with a surface-converting coating by multimodal imaging</td>
<td>Controlled suspensions as a method for small scale dissolution of poorly water-soluble compounds</td>
<td>Improvement of cellular uptake and antitumor efficacy of liposomal doxorubicin by targeting the CD133 marker</td>
</tr>
<tr>
<td>Francois Day, Ichern School of Medicine at Mount Sinai, U.S.A.</td>
<td>Sara Andersson, Uppsala University, Sweden</td>
<td>Leila Arabi, Mashhad University of Medical Sciences, Iran</td>
</tr>
<tr>
<td>4:25 PM 547</td>
<td>4:25 PM 365</td>
<td>4:25 PM 586</td>
</tr>
<tr>
<td>Nano-CaCO3 as a pH sensitive therapeutic platform for modulating the tumor extracellular environment</td>
<td>Development and Optimization of PLGA Nanoparticles as a Carrier System for Oral Delivery of Gemcitabine to Treat Breast Cancer</td>
<td>Endosomal FcRn-dependent Trafficking of Albumin</td>
</tr>
<tr>
<td>Avik Som, Washington University in St. Louis, U.S.A.</td>
<td>Guanyu Chen, University of Auckland, New Zealand</td>
<td>Maja Thim Larsen, Aarhus University, Denmark</td>
</tr>
<tr>
<td>4:32 PM 118</td>
<td>4:32 PM 364</td>
<td>4:32 PM 587</td>
</tr>
<tr>
<td>In-vitro and In-vivo Uptake of Liposomal Quantum Dots by Phagocytic Cells: Effective Approach for Imaging of Inflammation</td>
<td>DHP107, the first-generation oral paclitaxel delivery system</td>
<td>Long circulating Ferritin Nanocage with ‘Protein cloud’</td>
</tr>
<tr>
<td>Gershon Golomb, The Hebrew University of Jerusalem, Israel</td>
<td>In-Hyun Lee, Dae Hwa Pharm. Co., South Korea</td>
<td>Na Kyeong Lee, Korea Institute of Science and Technology, South Korea</td>
</tr>
<tr>
<td>4:39 PM 471</td>
<td>4:39 PM 152</td>
<td>4:39 PM 606</td>
</tr>
<tr>
<td>Binding of Human Serum Albumin to Liposomes Studied by Fluorescence Correlation Spectroscopy</td>
<td>Nanocrystal-Polymer Particles: a Novel Approach to Treat Osteoarthritis</td>
<td>Injectable Self-assembled Gelatin Cell Constructs for Tissue Engineering</td>
</tr>
<tr>
<td>Kasper Kristensen, Technical University of Denmark, Denmark</td>
<td>Pierre Maudens, University of Geneva, Switzerland</td>
<td>Yi-You Huang, National Taiwan University, Taiwan</td>
</tr>
<tr>
<td>4:46 PM 477</td>
<td>4:46 PM 186</td>
<td>4:46 PM 600</td>
</tr>
<tr>
<td>Nadezhda Osipova, Drugs Technology LLC, Russia</td>
<td>Wouter Lokerse, Ludwig Maximilians University, Germany</td>
<td>Alexander Moncion Baez, University of Michigan, U.S.A.</td>
</tr>
<tr>
<td>4:53 PM 480</td>
<td>4:53 PM 170</td>
<td>4:53 PM 597</td>
</tr>
<tr>
<td>Effect of Polymer Source on the In Vitro Release Characteristics of In Situ Forming Implants</td>
<td>A systematic development of liposomes to enhance lymphatic drug targeting</td>
<td>Novel thin heparin-functionalized hydrogel-coatings for controlled VEGF release</td>
</tr>
<tr>
<td>Min Sung Suh, University of Connecticut, U.S.A.</td>
<td>Swapnil Khadke, Aston University, United Kingdom</td>
<td>Christiane Claassen, University of Stuttgart, Germany</td>
</tr>
</tbody>
</table>

**Room 6B Group A**

Includes the following session categories: Physical Oncology, Integration of Imaging and Drug Delivery, and Parenteral Systemic Delivery of Biopharmaceuticals

**Session Chair:** David Peeler

- 4:04 PM 483 Liposomes Reloaded: A novel strategy for loading “unloadable” drugs into stealth liposomes
  - Surojit Sur, Johns Hopkins Medical Institutions, U.S.A.

- 4:11 PM 541 Hyperthermia-induced Triggered Release of cisplatin from Thermosensitive Liposomes and Changes in Tumor Microenvironment in Non-Small Cell Lung Carcinoma
  - Yannan Nancy Dou, University of Toronto, Canada

- 4:18 PM 132 Investigating tumor cell specificity of a nanoparticle with a surface-converting coating by multimodal imaging
  - Francois Day, Ichern School of Medicine at Mount Sinai, U.S.A.

- 4:25 PM 547 Nano-CaCO3 as a pH sensitive therapeutic platform for modulating the tumor extracellular environment
  - Avik Som, Washington University in St. Louis, U.S.A.

- 4:32 PM 118 In-vitro and In-vivo Uptake of Liposomal Quantum Dots by Phagocytic Cells: Effective Approach for Imaging of Inflammation
  - Gershon Golomb, The Hebrew University of Jerusalem, Israel

- 4:39 PM 471 Binding of Human Serum Albumin to Liposomes Studied by Fluorescence Correlation Spectroscopy
  - Kasper Kristensen, Technical University of Denmark, Denmark

- 4:46 PM 477 Intravenous albumin-based formulation of rifabutin: toxicological evaluation
  - Nadezhda Osipova, Drugs Technology LLC, Russia

- 4:53 PM 480 Effect of Polymer Source on the In Vitro Release Characteristics of In Situ Forming Implants
  - Min Sung Suh, University of Connecticut, U.S.A.
Breadth and depth of proven technologies and capabilities. Technology selection and formulation methodologies based on extensive scientific investigation and modeling. Through the integration of Capsugel, Bend Research, Encap Drug Delivery, Xcelience and Powdersize, we bring the expertise needed to meet bioavailability and other target product profile requirements. Our strengths span design, development and manufacturing – an integrated process to take your product from start to finish, all under one point of contact, to meet your commercial objectives while minimizing costs, time and risk.

**Capsugel Dosage Form Solutions CRS Industry Roundtable**
“Current Trends in Bioavailability Enhancing Technologies”
**Wednesday, July 20, 8:00am - 9:30am**
Visit us in booth #504

To find your solution visit www.Capsugel.com/DFS or call +1.541-312-CAPS.
<table>
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<th>Room 611–614</th>
<th>Room 6B</th>
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</thead>
<tbody>
<tr>
<td><strong>“Thinking Outside the Box” Delivery Technologies: Nanocarriers from Nature</strong>&lt;br&gt;Moderator: Claus-Michael Lehr&lt;br&gt;Session Chairs: Laura Ensign and Alexander Florence</td>
<td><strong>Tissue Engineering</strong>&lt;br&gt;Moderator: Buddy Ratner&lt;br&gt;Session Chairs: Hyun Joon Kong and Todd Hoare</td>
<td><strong>Transdermal Delivery</strong>&lt;br&gt;Moderator: Mark Prausnitz&lt;br&gt;Session Chair: Samir Mitrogontri</td>
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</table>

**Invited Speaker**<br>8:05 AM 28<br>Exosome mimetics-based platform technology for targeted drug delivery and adjuvant-free vaccine<br>Yong Song Gho, POSTECH, Korea

**Research Highlight Talks**<br>8:45 AM 584<br>Dendritic cells derived extracellular vesicles for the combinational therapy against tumor<br>Zhiping Zhang, Huazhong University of Science and Technology, China

8:53 AM 585<br>Neutrophil membrane-formed Nanovesicles for Vascular Targeting Delivery<br>Zhenjia Wang, Washington State University, U.S.A.

9:01 AM 588<br>Enzymatic and Anti-Tumorigenic Effect of PH20-Expressing Exosome<br>Yoonsun Hong, Korea Institute of Science and Technology, Korea

9:09 AM 591<br>Fusogenic exosomes as a platform for therapeutic applications<br>Yoo soo Yang, Korea Institute of Science and Technology, Korea

9:17 AM 590<br>Time-resolved fluorescence microscopy imaging of paclitaxel-loaded extracellular vesicles in prostate cancer cells<br>Liisa Niemi, University of Helsinki, Finland

**Invited Speaker**<br>8:05 AM 29<br>The Tissue Engineering-Drug Delivery Intersection<br>Buddy Ratner, University of Washington, U.S.A.

8:30 AM 30<br>Modular Inductive High-Density Cell Culture Systems for Engineering Complex Tissues<br>Eben Alsberg, Case Western Reserve University, U.S.A.

8:55 AM 607<br>Engineering the Microenvironment of Lymphoid Tissue to Promote Antigen-specific Immune Tolerance<br>Christopher Jewell, University of Maryland, U.S.A.

9:03 AM 602<br>Blebbistatin-Loaded Poly(D,L lactide-co-glycolide) Particles For Treating Arthrofibrosis<br>Keerthi Atluri, University of Iowa, U.S.A.

9:11 AM 608<br>3DCellMakers: Thermo-gelling Polymers for 3D Cell Culture<br>Justin Hadar, Akina, Inc., U.S.A.

9:19 AM 598<br>A bioabsorbable composite patch for esophageal reconstruction<br>Rossella Dorati, University of Pavia, Italy

**Research Highlight Talks**<br>8:45 AM 615<br>Carboxylated nanodiamond as a topical drug delivery vehicle: stability and permeation-enhancing effect<br>Dae Gon Lim, Dongguk University, South Korea

8:53 AM 618<br>A novel gel formulation with nanoscale cavitation nucleation agent and OVA for ultrasound-assisted transdermal vaccine delivery and generation of anti-OVA antibodies in mice<br>Robert Carlisle, University of Oxford, United Kingdom

9:01 AM 617<br>Thermoresponsive nanogel mediated protein replacement therapy restores skin-barrier function to full-thickness skin models derived from Transglutaminase 1 deficient patients<br>Guy Yealland, Free University of Berlin, Germany

9:09 AM 637<br>Evaluation of Fractional Laser Ablation for the Controlled Transdermal Delivery of Paliperidone and the Development of a Mathematical Model for Laser-Assisted Drug Transport<br>Cesar Eulogio Serna Jimenez, University of Geneva, Switzerland

9:17 AM 635<br>Bacillus subtilis alkaline protease as a potential biological skin permeation enhancer<br>Mohamed Nounou, Appalachian College of Pharmacy, U.S.A.
With data collected from individuals on genetic factors, environment and lifestyle, researchers are able to find innovative ways to prevent, treat and monitor disease. Join this discussion to learn how our speakers are revolutionizing the way to improve health on a personal basis.

Invited Speakers:
- Pieter Cullis, University of British Columbia, Canada
- Peter Senter, Seattle Genetics, U.S.A.

**Program Highlights**

**Industry Roundtable**
Precision Medicine: Discovery and Development of Advanced Therapy Medicinal Products
Sponsored by Boehringer Ingelheim Pharmaceuticals, Inc.
8:00 – 9:30 a.m. • Room 6A

**Plenary Session**
Turning Science to Entrepreneurship: A Journey of Passion
11:15 a.m. – 12:15 p.m. • Room 6B

![Jun Keun Chang](image_url)
CreActive Health Holdings, Korea
Moderator: Kinam Park
### Scientific Program • Tuesday 1:30 – 3:00 p.m.

<table>
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<tr>
<th>Room 608–609</th>
<th>Room 6B</th>
<th>Room 611–614</th>
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</thead>
<tbody>
<tr>
<td><strong>Delivery Technologies in Nutraceuticals, Food, and Oral Products</strong></td>
<td><strong>Ocular Drug Delivery</strong></td>
<td><strong>Physical Oncology: Modulating Tumor Microenvironment for Drug Delivery</strong></td>
</tr>
<tr>
<td><strong>Moderator:</strong> Yoav Blatt</td>
<td><strong>Moderator:</strong> Kannan Rangaramanujam</td>
<td><strong>Moderator:</strong> Hamid Ghandehari</td>
</tr>
<tr>
<td><strong>Session Chairs:</strong> Ken Carson and James Oxley</td>
<td><strong>Session Chairs:</strong> Hong Wen and Yan Wang</td>
<td><strong>Session Chairs:</strong> In-San Kim and Tatiana Bronich</td>
</tr>
</tbody>
</table>

#### Invited Speaker

**1:35 PM**
Stabilization of water-in-water emulsions
Robert Tromp, NIZO Food Research, The Netherlands

#### Research Highlight Talks

**2:15 PM**
Oxidative Stability Prediction of Microencapsulated Flavor Using an Accelerated Oxidation Test and True Particle Density
Rutger van Sleeuwen, Firmenich, Inc., U.S.A.

**2:23 PM**
Food Grade Gelatin/Gum Arabic Capsules for In-Dough Extruded Snack/Cereal Applications Anticancer Drug for Colon Targeting
Julie Wieland, International Flavors & Fragrances, U.S.A.

**2:31 PM**
Taste Masking Strategies Using Ion Exchange Exipients
Amie Gehris, The Dow Chemical Company, U.S.A.

**2:39 PM**
The Phytochemical Chlorogenic Acid Rescues Oxidative Damage in a Zebrafish Model
Arlene McDowell, University of Otago, New Zealand

**2:47 PM**
Microencapsulated Diindolylmethane (DIM): Optimizing Formulation Performance and Market Appeal
Irwin Jacobs, Jacobs Controlled Release Consulting, LLC, U.S.A.

**2:35 PM**
Siilicon-Based Nanomaterials for Ocular Drug Delivery
**Michael Sailor**, University of California, San Diego, U.S.A.

**2:00 PM**
Bridging Product Design and Performance for Bioequivalence: A Journey through the Eye
**Xiaoming Xu**, FDA, U.S.A.

**2:25 PM**
An Update on FDA’s Research Program for Ophthalmic Generic Products
**Stephanie Choi**, FDA, U.S.A.

**2:50 PM**
Retinylamine Modified Multifunctional Lipid DNA Delivery System for the Treatment of LCA2
**Da Sun**, Case Western Reserve University, U.S.A.

**2:58 PM**
Smart Wireless Contact Lens for Ocular Theranosis
**Dohee Keum**, POSTECH, Korea

**1:35 PM**
Enhancing Blood Perfusion in Tumor Tissue by preventing Tumor associated Thrombosis using oral Heparin to improve the Distribution of Anti-cancer drugs
**Youngru Byun**, Seoul National University, Korea

**2:15 PM**
Enhancement of EPR effect in nanomedicine with nitric oxide-releasing liposome
**Yoshiki Katayama**, Kyushu University, Japan

**2:23 PM**
Role of Cancer-Associated Fibroblasts on Drug Response of Pancreatic Cancer Using Tumor-Microenvironment-on-Chip
**Bumsoo Han**, Purdue University, U.S.A.

**2:31 PM**
Junction opener protein increases nanoparticle accumulation in solid tumors in a size-dependent manner
**Christine Wang**, University of Washington, U.S.A.

**2:39 PM**
High Intensity Focused Ultrasound Hyperthermia for Enhanced Macromolecular Delivery
**Nick Frazier**, University of Utah, U.S.A.

**2:47 PM**
Designed protein therapeutics for enhancing anti-tumor immune response
**Eun Jung Lee**, Korea Institute of Science and Technology, South Korea
Over the last few years there has been a dramatic increase in the market for monoclonal antibody drugs. These drugs are typically administered intravenously in hospital or office settings. For certain chronic diseases that require frequent injection over prolonged periods, there is a growing interest in subcutaneous delivery to enhance the convenience for a healthcare professional or to facilitate self-administration by patients at home. A major challenge is that the high doses required can result in large liquid volumes (>1.5 mL) or viscous formulations that are typically difficult to administer in a single injection.

A number of leading biopharmaceutical thought leaders have been assembled to outline the opportunities and challenges in this area. The panelists will discuss recent data and outline various device strategies that are being explored in this exciting new area.

Invited Speakers
Shawn Davis, Amgen
Justin Wright, Eli Lilly and Company
J. Anand Subramony, Medimmune

Tuesday, July 19 – Afternoon

Schedule-at-a-Glance
12:15 – 1:30 p.m.  Journal of Controlled Release Editorial Board Meeting • Room 306
12:30 – 1:30 p.m.  C&DP Luncheon* • Room 602–604
1:30 – 3:00 p.m.  Scientific Program
3:00 – 4:15 p.m.  Exposition and Poster Sessions
3:15 – 3:45 p.m.  Even Numbered Poster Authors Present
3:45 – 4:15 p.m.  Odd Numbered Poster Authors Present
4:15 – 5:15 p.m.  2017 CRS Annual Meeting Program Committee Meeting • Room 306
4:15 – 7:00 p.m.  Exposition Take-Down
4:30 – 5:00 p.m.  CRS Award Lecture • Room 608–609
4:30 – 5:30 p.m.  Research Highlight Talk Sessions - NEW!
5:30 – 7:00 p.m.  Women in Science Networking Event* • Room 6A
7:30 – 10:00 p.m.  Beyond the Science: A Night Out!

Program Highlights
Industry Roundtable
Challenges and Opportunities: Subcutaneous Delivery of High Volume/High Viscosity Biologic Formulations from Combination Devices
Sponsored by MERCK
1:30 – 3:00 p.m. • Room 6A

Young Investigator Award Lecture
Hydrogel-forming Microneedles for Drug Delivery and Patient Monitoring
4:30 – 5:30 p.m. • Room 608–609

CRS T. Nagai Postdoctoral Research Achievement Award Lecture
Bio-inspired Materials and Carriers for Small RNA Delivery
4:30 – 5:30 p.m. • Room 608–609

Women in Science Networking Event*
My Academic Journey: Lessons Learned
5:30 – 7:00 p.m. • Room 6A
Speaker: Helen Burt, University of British Columbia, Canada

Beyond the Science: A Night Out!
7:30 – 10:00 p.m. • Pike Place Market/Pikes Brewing Co. (offsite)

*Additional registration, payment, and ticket required
### Room 611–614

**Group E**

Includes the following session categories: Comparative Pharmacokinetics in Preclinical Sciences; Ocular Drug Delivery; and Preclinical Science Challenges to Drug Delivery

**Session Chairs:** Laura Ensign and Todd Hoare

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:34 PM</td>
<td>OptisSporin®-Development of Controlled Release Cyclosporin for the treatment of posterior uveitis</td>
<td>Katherine Bamsey, Midatech Pharma, United Kingdom</td>
</tr>
<tr>
<td>4:41 PM</td>
<td>Ultrasound-responsive nanobubbles for enhanced posterior eye delivery of therapeutics</td>
<td>Sachin Thakur, University of Queensland, Australia</td>
</tr>
<tr>
<td>4:48 PM</td>
<td>Dextran Sulfate Wafer as an Anti-Angiogenic Polymer Therapeutic</td>
<td>Crystal Shin, Baylor College of Medicine, U.S.A.</td>
</tr>
<tr>
<td>4:55 PM</td>
<td>Controlled Release of Avastin® from the Tethadur® Biodegradable Matrix</td>
<td>Catherine Kelly, PsiMedica, United Kingdom</td>
</tr>
<tr>
<td>5:02 PM</td>
<td>A phospholipid-based phase separation gel for the prolonged delivery of octreotide</td>
<td>Yao Fu, Sichuan University, China</td>
</tr>
<tr>
<td>5:09 PM</td>
<td>Wet-milled nanoparticulate suspensions (Wnano) of compound A formulated in subcutaneous pumps for in vivo sustained release in preclinical studies</td>
<td>Tao Zhang, Pfizer Inc., U.S.A.</td>
</tr>
<tr>
<td>5:16 PM</td>
<td>Effect of Phospholipase A2 Receptor (PLA2R) Expression on Tumorigenesis and Performance of Lipid-Nanomedicines in Prostate Cancer</td>
<td>Robert Arnold, Auburn University, U.S.A.</td>
</tr>
<tr>
<td>5:23 PM</td>
<td>In vitro-ex vivo correlations between a novel cell-laden hydrogel and mucosal tissue for screening composite delivery systems</td>
<td>Anna Blakney, University of Washington, U.S.A.</td>
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</tbody>
</table>

### Room 606–607

**Group F**

Includes the following session categories: Oligonucleotide Delivery: New Applications and Opportunities; Peptides, Proteins, and Vaccines; and Overcoming Biological Barriers in Drug Delivery

**Session Chairs:** Anthony Kim and Jung-Soo Suk

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter/Institution</th>
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<tbody>
<tr>
<td>4:34 PM</td>
<td>Investigating the Interior of Lipid Nanoparticles for mRNA Delivery by Surface Enhanced DNP-NMR</td>
<td>Staffan Schantz, AstraZeneca R&amp;D Mölndal, Sweden</td>
</tr>
<tr>
<td>4:41 PM</td>
<td>Affinity improvement of interleukin-4 receptor binding peptides using NeutrAvidin/biotin complexes and its effect on signaling and survival of tumor cells</td>
<td>Cheong-wun Kim, Kyungpook National University, South Korea</td>
</tr>
<tr>
<td>4:48 PM</td>
<td>Selection of triple negative breast cancer cell-binding peptides using phage display</td>
<td>Yun-ki Lee, Kyungpook National University, South Korea</td>
</tr>
<tr>
<td>4:55 PM</td>
<td>Formulation and characterization of a hexagonal liquid crystalline drug delivery system</td>
<td>Ellina Mun, Purdue University, U.S.A.</td>
</tr>
<tr>
<td>5:02 PM</td>
<td>Hydrophobized Microgels for the Delivery of Antipsychotic Drugs to the Brain</td>
<td>Madeline Simpson, McMaster University, Canada</td>
</tr>
<tr>
<td>5:09 PM</td>
<td>Smart Design of Antibody Therapeutics for Treatment of Rheumatoid Arthritis</td>
<td>Sei Kwang Hahn, POSTECH, Korea</td>
</tr>
<tr>
<td>5:16 PM</td>
<td>Non-specific Binding and Steric Hindrance Thresholds for Penetration of Nanoparticles in Tumor Tissue</td>
<td>Jimena Perez Bermudez, University of Maryland Baltimore, U.S.A.</td>
</tr>
<tr>
<td>5:23 PM</td>
<td>Polymer Architecture and Chain Length Influence Macrophage Response to Micelles</td>
<td>Richard Gemeinhart, University of Illinois, U.S.A.</td>
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</table>
Room 608–609

Group G

Features: Award lectures from the CRS T. Nagai Postdoctoral Research Achievement and the Young Investigator awardees, and session categories: Preclinical Science Challenges to Drug Delivery; Transdermal Delivery.

Session Chairs: Charlie Martin and Ron Siegel

4:35 PM  32
Young Investigator Award Lecture: Hydrogel-forming Microneedles for Drug Delivery and Patient Monitoring
Ryan Donnelly, Queen’s University Belfast, United Kingdom

4:47 PM  19
CRS T. Nagai Award Lecture: Bio-inspired Materials and Carriers for Small RNA Delivery
Koen Raemdonck, Ghent University, Belgium

4:59 PM  623
Biologic Delivery of pDNA-coated Particles with a MEMS Device Shows SEAP Expression in Mice
Fatemeh Nazly Pirmoradi, Palo Alto Research Center Inc. (PARC), U.S.A.

5:06 PM  624
Nicotine delivery rates from programmable carbon nanotube membrane-based transdermal delivery device as determined by microdialysis method
Gaurav Kumar Gulati, University of Washington, U.S.A.

5:13 PM  554
Cisplatin-conjugated gold nanoparticles for improved radiotherapeutic effects in in vitro models of triple negative breast cancer
Sohyoung Her, University of Toronto, Canada

5:20 PM  636
Controlled Anodal Iontophoretic Delivery of Biolabile Hydrosoluble Raloxifene Prodrugs
César Serna, University of Geneva, Switzerland
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<tr>
<td><strong>Local Drug Delivery</strong></td>
<td><strong>New Processes, New Materials, New Products</strong></td>
<td><strong>mRNA Delivery and Clinical Translation for Vaccines and Therapeutics Mini Symposium</strong></td>
</tr>
</tbody>
</table>
| **Sponsored by** Catalent. | | **Moderator:** Gerald Zon  
**Chair:** Mark Tracy |
| **Moderator:** Justin Hanes  
**Session Chairs:** Richard Gemeinhart and Farid Dorkoosh | **Moderator:** Ryan Donnelly  
**Session Chairs:** Elias Fattal and Heidi Mansour | |
| **Invited Speaker**  
8:05 AM  
6 | **Invited Speaker**  
8:05 AM  
10 | **Over the last couple of years, mRNAs have emerged as a new class of nucleic acid molecules with great promise as therapeutics and vaccines. Potent, safe intracellular delivery of these large RNAs is a key to enabling these molecules as drugs and vaccines. There are some common aspects of delivery between oligonucleotides (e.g., siRNAs) and mRNAs but important differences too. This mini-symposium focuses on mRNA itself, the challenges in delivering mRNA, and current progress in developing delivery systems for mRNA with an emphasis on the potential for clinical translation for vaccines and therapeutics.**  
**Invited Speakers**  
8:05 AM  
Katalin Karikó, BioNTech AG  
8:25 AM  
Patrick Baumhof, CureVac GmbH  
8:45 AM  
Thomas Madden, Acuitas Therapeutics |  
8:05 AM  
**Abstract not available**  
Khuloud Al-Jamal, King's College London, United Kingdom  
8:25 AM  
**Nitric Oxide: A key player for novel anti-cancer immunotherapeutics**  
Yukio Nagasaki, University of Tsukuba, Japan  
8:45 AM  
**Transformable Liquid-Metal Nanomedicine**  
Yue Lu, University of North Carolina at Chapel Hill and North Carolina State University, U.S.A. |  
8:05 AM  
**Panel Discussion** | |
| **Research Highlight Talks**  
8:45 AM  
189 | **Research Highlight Talks**  
8:45 AM  
243  
**Nitric Oxide: A key player for novel anti-cancer immunotherapeutics**  
Yukio Nagasaki, University of Tsukuba, Japan |  
8:05 AM  
**Panel Discussion** |  
8:05 AM  
**Panel Discussion** |
| **Temperature sensitive liposomal doxorubicin combined with tumor ablation: effect of heating duration and administration schedule**  
Dieter Haemmerich, Medical University of South Carolina, U.S.A. | **Three-dimensional micro-patterning of biodegradable polymers for controlled drug delivery**  
Thanh Nguyen, University of Connecticut, U.S.A. |  
8:05 AM  
**Panel Discussion** |
| 8:53 AM  
191 | 9:01 AM  
240 |  
8:05 AM  
**Panel Discussion** |
| **Formulation of Stimuli-Sensitive Thiolated Hyaluronic Acid Based Nanofibers: Synthesis, Characterization, Preclinical Safety and In Vitro anti-HIV Activity**  
Vivek Agrahari, University of Missouri-Kansas City, U.S.A. | **Three-dimensional micro-patterning of biodegradable polymers for controlled drug delivery**  
Thanh Nguyen, University of Connecticut, U.S.A. |  
8:05 AM  
**Panel Discussion** |
| 9:01 AM  
199 | 9:09 AM  
242 |  
8:05 AM  
**Panel Discussion** |
| **Convection-enhanced delivery of radiosensitizing-nanoparticles for the treatment of intracranial glioma**  
Amanda King, Yale University, U.S.A. | **Tumor acidity sensitive polymeric micelle for selective cellular uptake of doxorubicin**  
Yuki Hiruta, Keio University, Japan |  
8:05 AM  
**Panel Discussion** |
| 9:09 AM  
148 | 9:17 AM  
247 |  
8:05 AM  
**Panel Discussion** |
| **Pharmacokinetics and preventive effects of platinum nanoparticles as reactive oxygen species scavengers on peritoneal dissemination of tumor cells**  
Hidehisa Katsumi, Kyoto Pharmaceutical University, Japan | **Coupling 3D Printing with Hot Melt Extrusion Technology to Continuously Produce Controlled Release Tablets**  
Roshan Tiwari, University of Mississippi, U.S.A. |  
8:05 AM  
**Panel Discussion** |
| 9:17 AM  
196 | 9:17 AM  
247 |  
8:05 AM  
**Panel Discussion** |
| **Mounting Evidence of Pulmonary Nanoparticles as an Effective Lymphatic Targeting Delivery System**  
Joshua Reineke, South Dakota State University, U.S.A. |  |  
8:05 AM  
**Panel Discussion** |
Despite significant technical advances in drug delivery systems over the past three decades, finding clinical applications where cancer nanomedicines can make a transformative impact on treatment practice has remained elusive. However, we are now seeing evidence of marked improvements in cancer patient outcomes for both liposome- and nanoparticle-based nanomedicines, particularly when applied in a setting of combination therapy. This session will review the challenges historically facing the development of high-impact cancer nanomedicines and provide recent examples where significant improvements in patient outcomes have been achieved in late-stage clinical trials.

Invited Speakers
8:00 AM
Mark Davis, California Institute of Technology

8:30 AM
Scott Eliasof, Cerulean Pharma Inc.

9:00 AM
Lawrence Mayer, Celator Pharmaceuticals, Inc.

More than 60% of the compounds in pharmaceutical pipelines today are considered to be poorly bioavailable due to slow dissolution rate or poor solubility. This has led to a need for using increasingly sophisticated delivery technologies. These technologies range from particle size reduction technology aimed at increasing dissolution rates to amorphous dispersions and lipid delivery technologies.

Expert panel members will participate from the pharmaceutical, contract research, market intelligence industries and academia. During this roundtable, we will share viewpoints on bioavailability enhancing technologies and how to rationally choose the best technology.

Invited Speakers
Patrick Marsac, University of Kentucky
Derek Hennecke, Xcelience, LLC
Colin Pouton, Monash University
David Vodak, Bend Research/Capsugel
Jon Miller, Vertex Pharmaceuticals
Jon Morris, AbbVie

VYXEOS™ (CPX-351) significantly improves overall survival in phase 3 high-risk AML trial, validating the CombiPlex technology and opening opportunities for novel combinations

Lawrence Mayer, Celator Pharmaceuticals, Inc.
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<th>Room 608–609</th>
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<tr>
<td><strong>Comparative Pharmacokinetics in Preclinical Sciences</strong></td>
<td><strong>Encapsulation and Controlled Release for Industrial Applications</strong></td>
<td><strong>Overcoming Biological Barriers in Drug Delivery</strong></td>
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<tr>
<td><em>Moderator:</em> Marilyn Martinez</td>
<td><em>Moderator:</em> Jie Shen</td>
<td><em>Moderator:</em> Anand Subramony</td>
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<td><em>Session Chairs:</em> Thierry Vandamme and Praveen Hiremath</td>
<td><em>Session Chairs:</em> Teresa Virgalito and Yabin Lei</td>
<td><em>Session Chairs:</em> Yizhou Dong and Suzie Pun</td>
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**Invited Speaker**

9:50 AM 1

Considerations in the Use of the Beagle Dog as a Preclinical Species in Assessing Bioperformance and Oral Sustained Release Technology Development

Paul Walsh, Merck and Co., Inc., U.S.A.

**Research Highlight Talks**

10:30 AM 50

Design and Validation of an Intraocular In Vitro Simulator

Joanna Wang, University of California at San Diego, U.S.A.

10:38 AM 56

Bioavailability and pharmacokinetics of zidovudine mucoadhesive polymeric nanoparticles in rats

Liliane Pedreiro, University of São Paulo, Brazil

10:45 AM 51

Pharmacokinetic-pharmacodynamic analyses of nifdefine and propranolol in rats to investigate characteristics of effect and side effects - applications to controlled release

Akiko Kiriyama, Doshisha Women’s College of Liberal Arts, Japan

10:53 AM 52

Biodistribution of GDC-0449 Loaded Micelles in Liver Fibrotic Mice

Rinku Dutta, University of Nebraska Medical Center, U.S.A.

11:00 AM 54

Development of in-vivo Method for Intranasal Delivery of Powder or Solution Formulation

Gopinadh Bhyrapuneni, Suven Life Sciences Limited, India

**Invited Speaker**

9:50 AM 4

Multifunctional microcapsules for active anticorrosion and antifouling applications

Jinglei Yang, Hong Kong University of Science and Technology, China

**Research Highlight Talks**

10:30 AM 87

Controlled release of microencapsulated active from coatings: Polyelectrolyte shells as globally rate-determining barriers

Jonatan Bergek, Chalmers University of Technology, Sweden

10:38 AM 97

Parylene Coated Chemicals for Downhole Treatments

Ronald Versic, Ronald T. Dodge Company, U.S.A.

10:45 AM 89

Flame Retardant Encapsulation for Preparation of Nanofoams

Liang Chen, The Dow Chemical Company, U.S.A.

10:53 AM 91

Interfacial Microencapsulation Fundamentals: Re-visiting Select Historical Patents

James Essinger, Gowan Company, U.S.A.

11:00 AM 96

Novel contrast agents for Targeted Biomedical Imaging

Thierry Vandamme, University of Strasbourg, France

**Invited Speaker**

9:50 AM 18

Mechanisms for Improving Drug Delivery in Pancreatic Cancer

Murray Korc, Indiana University, U.S.A.

**Research Highlight Talks**

10:30 AM 441

Cellular tropism of intracranially delivered brain-penetrating nanoparticles

Alice Gaudin, Yale University, U.S.A.

10:38 AM 399

MicrObubble-Enhanced Ultrasound for Non-viral Gene Delivery to the Brain

James-Kevin Tan, University of Washington, U.S.A.

10:45 AM 438

Tuning the Mechanical Stiffness of Discoidal Polymeric Nanoconstructs inhibits macrophage uptake and enhances tumor accumulation

Anna Lisa Palange, Italian Institute of Technology, Italy

10:53 AM 460

Lipid-like Nanoparticles for mRNA Delivery in vivo

Yizhou Dong, The Ohio State University, U.S.A.

11:00 AM 402

Geometry optimized t-micelles: a trojan horse for enhanced brain delivery

Preshita Desai, Institute of Chemical Technology, India
Room 606–607

Taking Stock of Progress and Challenges in Drug Delivery and Targeting
Moderator: David Stepensky
Session Chairs: Wim Hennink and Ian Tucker

Invited Speaker
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Correlative, Causative, Curable and Credible: Reliability, Truth and Accuracy in Research Reporting
David Grainger, University of Utah, U.S.A.

Research Highlight Talks
10:30 AM 583
What are the most important controlled release products of all time?
Ian Tucker, University of Otago, New Zealand

10:38 AM 573
Pharmacokinetic and Tumour distribution properties of doxorubicin conjugated PEGylated dendrimers
Dharmini Mehta, Monash Institute of Pharmaceutical Sciences, Monash University, Australia

10:46 AM 578
The next generation active delivery strategies exploring non-competitive ligands to the receptor
Raghu Ganugula, Texas A&M Health Science Center, U.S.A.

10:54 AM 567
Development of PEGylated carboxylic acid modified polyamidoamine dendrimer as a bone targeting carrier for the treatment of bone diseases
Shugo Yamashita, Kyoto Pharmaceutical University, Japan

11:02 AM 568
Incorporation of taxol binding peptide enhances drug loading in polymeric micelles
Jennifer Logie, University of Toronto, Canada

6A

Consumer Connected Delivery Industry Roundtable
Sponsored by the CRS Consumer & Diversified Products Division
Moderators: Christopher McDaniel and James Oxley

Controlled release is expanding beyond the classic materials and related sciences that dominate our literature and meetings. With the proliferation of a connected society and greater access to data, the divide between personal health and healthcare is disappearing. Consumers are gaining more control over their choices and the technology used to improve their health. From smart patches and pills to apps and information technology, modern day consumer electronics are facilitating the connection between drug delivery, diagnostics, care management, and the consumer. This symposium brings together leaders in the area of connected delivery devices to present and discuss their solutions and vision for enabling consumer-controlled healthcare.

Invited Speakers
9:45 AM
The Future of Personalized Drug Delivery
Alan Levy, Chrono Therapeutics

10:05 AM
Healthcare Uses of Wearable Sensors
Russell Potts, Potts Consulting, LLC

10:25 AM
Smart Pharmaceuticals for the Precision Medicine Era
Jeff Zhimizu, Medimetrics

10:45 AM
Connected Sensing: Challenges and Opportunities
Janet Tamada, J. Tamada Consulting

11:05 AM
Panel Discussion

Schedule-at-a-Glance
12:30 – 2:00 p.m. Scientific Program
2:00 – 3:00 p.m. Plenary Session • Room 6B

Program Highlights
Plenary Session
Outgoing CRS Board members will be recognized at the start of the session.

Hyperbranched Polyglycerol-Based Nanoparticles for Treatment of Superficial Bladder Cancer: Preclinical Research and Development

2:00 p.m. – 3:00 p.m. • Room 6B

Helen Burt
University of British Columbia, Canada
Moderator: Christine Allen
### Scientific Program • Wednesday 12:30 – 2:00 p.m.

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<tr>
<td><strong>Oligonucleotide Delivery: New Applications and Opportunities</strong>&lt;br&gt;Moderator: Pieter Cullis&lt;br&gt;Session Chairs: Gaurav Sahay and Ken Howard</td>
<td><strong>Peptides, Proteins, and Vaccines</strong>&lt;br&gt;&lt;em&gt;Sponsored by&lt;/em&gt;&lt;br&gt;<strong>Catalent.</strong>&lt;br&gt;Moderator: Steven Schwendeman&lt;br&gt;Session Chairs: Patrick Baumhof and Yoon Yeo</td>
<td><strong>Preclinical Science Challenges to Drug Delivery</strong>&lt;br&gt;Moderator: David Brayden&lt;br&gt;Session Chair: Marianne Ashford</td>
</tr>
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#### Invited Speakers

**Room 611–614**

**12:35 PM 14** Engineering Cyclodextrin Nanoparticles for the Delivery of siRNA<br>**Andrew Geall**, Avidity NanoMedicines, U.S.A.

**1:00 PM 15** Design of lipid nanoparticle delivery systems to enable therapeutic applications of siRNA and mRNA<br>**Pieter Cullis**, University of British Columbia, Canada

#### Research Highlight Talks

**Room 611–614**

1:25 PM **307** Antisense oligonucleotide delivery using complementary DNA nanostructures<br>**Yu-Kyoung Oh**, Seoul National University, South Korea

1:33 PM **300** Biodegradable Dendritic Lipid Nanoparticles for Small RNA Delivery to Treat Gynecologic Cancers<br>**Petra Kos**, UT Southwestern Medical Center, U.S.A.

1:41 PM **291** Improving RNAi-mediated Gene Silencing of Chemically Modified siRNA-GalNAc Conjugate Using Phosphate Mimic<br>**Rubina Parmar**, Alnylam Pharmaceuticals, U.S.A.

1:49 PM **301** Combinatorial mTORC2 RNAi and laptanib for treatment of HER2-amplified breast cancer<br>**Craig Duvall**, Vanderbilt University, U.S.A.

**Room 6B**

**12:35 PM 22** Formulating to optimize peptide chemical and physical stability<br>**Elizabeth Topp**, Purdue University, U.S.A.

**1:15 PM 523** Investigating the Immunomodulatory Function of Carrier-Free Vaccine Capsules<br>**Christopher Jewell**, University of Maryland - College Park, U.S.A.

**1:31 PM 505** A Novel Immunotherapeutic Approach for Cancer by Foreignizing Tumor Cells Using a Polymeric Conjugate<br>**Jung Min Shin**, Sungkyunkwan University, South Korea

**1:39 PM 514** Self-assembling Peptide Epitopes for Tumor Vaccination<br>**Enrico Mastrobattista**, Utrecht Institute for Pharmaceutical Sciences, The Netherlands

**1:47 PM 510** Transnasal delivery of peptide agonist specific to neuromedin U receptor 2 to the brain for the treatment of obesity<br>**Akiko Tanaka**, Kyoto Pharmaceutical University, Japan

#### Invited Speaker

**1:00 PM 25** Organs-on-Chips: a Living Platform for Generating Human Relevant Data<br>**S. Jordan Kerns**, Emulate, Inc. U.S.A.

**1:25 PM 550** A Drug Selection Approach for Targeted Inhibition of Atherosclerotic Plaque Inflammation<br>**Amr Alaarg**, Translational and Molecular Imaging Institute, U.S.A.

**1:33 PM 557** Two types of systemic lymphatic uptake of macromolecules<br>**Mikhail (Misha) Papisov**, Massachusetts General Hospital & Harvard Medical School, U.S.A.

**1:41 PM 552** The Combination of BIBF 1120 (BIBF) and Paclitaxel (PTX) Independently Loaded in PLGA Nanoparticles as a Treatment for Endometrial Cancer (EC)<br>**Anh-vu Do**, University of Iowa, U.S.A.

**1:49 PM 553** High Capacity GCPQ Polymer Nanoemulsion Allows Efficient Delivery of Disulfiram for Cancer Therapy<br>**Erazuliana Abd Kadir**, University College London, United Kingdom
Room 6A

Predictive Modeling in Delivery and Targeting (Scaling: Mouse to Man; Probability of Reaching Targets; Stochastic Process in System Distribution)

Moderator: Ping Lee
Session Chair: Joshua Reineke

Invited Speaker
12:35 PM 26
Consideration of Dynamic Factors for Cancer Models and Modeling
You Han Bae, University of Utah, U.S.A.

Research Highlight Talks
1:15 PM 565
Gaussian Processes: Towards better modelling of drug-loading in solid lipid nanoparticles
Rania Hathout, Ain Shams University, Egypt

1:23 PM 385
PBPK modelling applied to a weak acid drug formulated as a gastro-resistant (GR) tablet
Teófilo Vasconcelos, BIAL, Portugal

1:31 PM 564
Evaluation of in vitro tests to reduce animal testing in drug toxicology studies
Jon Mole, Sirius Analytical Inc., U.S.A.

1:39 PM 563
Multi-scale Modeling of Drug Release through Polymer Hydrogels
Aditya Pareek, TRDDC-TCS Innovation Labs, India

1:47 PM 566
Targeting and altering in vivo macrophage responses with modified polymer properties
Kaitlin Bratlie, Iowa State University, U.S.A.
Connect @ the Expo

Exposition Hall (Room 4 AB, Level 4)

The CRS Exposition is the place to CONNECT and discover the latest delivery science and technology trends! Meet face-to-face with leading companies from around the world—learn about new products, discuss industry challenges, and build your network.

2016 Exhibitors (as of June 16, 2016)

Detailed description of current Exhibitors and the schedule of Exposition hours can be found in the CRS Meeting App.

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<td>Logans Instruments Corp., USA</td>
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<td>TRANSFERRA Nanosciences Inc., Canada*</td>
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<td>505</td>
<td>Lipoid, LLC, USA</td>
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*Denotes 2016 CRS Annual Meeting & Exposition Sponsor (as of June 16, 2016)
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2016 CRS Awards & Recognition

Congratulations to the 2016 Award Winners

CRS is honored to continue the tradition of recognizing the excellence of our members. Please be sure to attend the award ceremony on Sunday, July 17, and personally congratulate the awardees on their well-earned commendation. Find full biographies of awardees on the CRS website.

Distinguished Service Award

The Distinguished Service Award is presented to a CRS member who has exhibited exceptional commitment and service to the society and is selected by the Board of Directors.

Ian Tucker
University of Otago, New Zealand

Founders Award

The society grants this honor to a current CRS member who is internationally recognized for outstanding contributions in the science and technology of controlled release.

Hans E. Junginger
Leiden University, Germany

College of Fellows

The College of Fellows recognizes those members who have made outstanding contributions to the field of delivery science and technology over a minimum of 10 years. Contributions may have been technical, scientific, and/or managerial in one or more fields of research, commercial development, education, and/or leadership within the areas of interest to CRS. Fellowship is the most prestigious level of membership in CRS.

Elias Fattal
University of Paris Sud, France

Marilyn Martínez
FDA Center for Veterinary Medicine, U.S.A.

Vinod Labhasetwar
Cleveland Clinic, U.S.A.

Steven Schwendeman
University of Michigan, U.S.A.

CRS T. Nagai Postdoctoral Research Achievement Award

Cosponsored by The Nagai Foundation Tokyo

This award recognizes an individual postdoc who has recently completed postdoctoral research in controlled release science and technology and the postdoc’s advisor, who played an integral role in the achievements.

Koen Raemdonck
Ghent University, Belgium

Stefaan C. De Smedt
Ghent University, Belgium

Young Investigator Award

This award recognizes a CRS member who has made outstanding contributions in the science of controlled release and is 40 years of age or younger in the year the award is presented.

Ryan Donnelly
Queen’s University Belfast, United Kingdom
2016 CRS Awards & Recognition

Jorge Heller Journal of Controlled Release Outstanding Paper Award
Cosponsored by Elsevier

This award recognizes an outstanding regular paper related to the science of controlled release (not an invited, review, or special meeting paper) that was published during 2015 in the Journal of Controlled Release.

Robert Carlisle
University of Oxford, United Kingdom


Drug Delivery and Translational Research Outstanding Paper Award
Cosponsored by Springer

This award recognizes outstanding research in the field of drug delivery and translational research that was published during 2015 in Drug Delivery and Translational Research.

Andrés J. García
Georgia Institute of Technology, U.S.A.


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