



## Industrial Green Chemistry Workshop (IGCW-2009) - Report

### *IGC summit opens up new vistas in industrial green chemistry and technologies*

**The Industrial Green Chemistry Workshop (IGCW-2009) held between 4-5 December, 2009, in Mumbai, India,** was a major milestone event organized by Green ChemisTree foundation in association with Newreka GreenSynth Technologies Pvt Ltd, GCNC- India Chapter of ACS-GCI and Chemical Industry Digest, to create an awareness and provide the momentum for green chemistry and engineering technologies.

The purpose of organizing IGCW-2009 was to align organization's directions with global trends in sustainability, besides exploring opportunities for leveraging industrial green chemistry models for business differentiation and competitiveness.

IGCW-2009 was principally scheduled on the basis of 9-Eye (I) Approach. Each 'eye' of IGCW-2009 expanded the vision of participants and engaging them into emerging views of Industrial Green Chemistry paradigms and its implementation to create tangible and intangible benefits for the stakeholders.

#### **Inaugural Session**

**Mr. Nitesh Mehta, MD of Newreka GreenSynth Technologies P.Ltd., Mumbai,** delivered the welcome address and laid the foundation for conference. He emphasized on the need for exploring all options to enable industry to shift to more sustainable manufacturing.

**Dr. T Ramasami, Secretary, Department of Science and Technology (DST), GOI,** inaugurated the 3 day event. He also felicitated Prof Paul Anastas and Prof John Warner for completion of 12 years of 12 Principles of Green Chemistry and Engineering.

Dr Ramasamy released the IGCE 2009 background position report, “*Industrial Green Chemistry and Technology: Mapping Transformations*” prepared by KnowGenix. This document covers last 25 years of journey in industrial green chemistry and technology in the Indian and global context.

The chief Guest address delivered by Dr Ramasami emphasized on Government's initiative in implementing industrial green chemistry and various barriers to its implementation. He also presented a case study of Chromium replacement and environmentally benign oxidations.

**Prof Paul Anastas, Scientific Advisor, USEPA**, delivered the keynote Presentation by Prof Paul Anastas on "*Green Chemistry: from here to sustainability.*" He explained the entire genesis of the green chemistry movement and elaborated on the need for transformation.

Day one focused on three key themes : Ignition , Inspiration and Initiation and was attended by over 200 Senior Management, Directors, CEOs, Consultants, Entrepreneurs, Strategic Advisors, etc. to recognize and explore the ecological and economical footprint of Industrial Green Chemistry through:

The theme session, **Ignition**, was aimed to ignite the awareness of participants towards Green chemistry and engineering based solution. Speakers of this theme consisted of **Prof John Warner, President and CTO of Warner Babcock Institute** who spoke on "*Green Chemistry Through collaborative Innovation*" while **Dr Murli Sastry, CSO of Tata Chemicals Innovation Centre**, threw light on "*100 years journey of sustainability at Tata Group.*" The session was chaired by Dr Rajender Varma of USEPA.

The following theme session, **Inspiration**, aimed to inspire people through real world case studies of green chemistry and engineering solution which have become profit centers today.

The session, chaired by Prof Paul Anastas, focused on successful case studies of industrial green chemistry implementation at commercial level. **Dr Joseph Armstrong of Merck &Co Inc.** spoke on "*Innovation as driver of Green Chemistry advances in the Pharmaceutical Industry*" while **Dr Rakeshwar Bandichhor of Dr Reddy's Laboratories** elaborated the experiences of his organization in his talk, "*Pharmaceutical Industry as an Epicenter of Green Chemistry: A perspective*"

The theme session on, **Initiation**, was on initiating green chemistry and engineering based solutions and use them as an environmentally friendly alternative as against conventional technologies. The session was chaired by Dr John Warner. **Dr Robert Peoples, Director, ACS-**

**GCI**, spoke on “**Green chemistry means business**” and how implementing initiatives based on green chemistry and engineering can become profit centre for an organization.

“*Green chemistry and technology platforms: design and development strategy*”, was the theme of the talk given by **Dr R Rajgopal, CCO, KnowGenix**. He discussed the need for taking green chemistry and technology to the next level by leveraging the potential of new technologies and past experiences.

**Dr R Brakaspathy, Scientist, DST**. in his talk on “*Department of Science & Technology : Initiatives to promote green chemistry*” discussed the various initiatives taken by DST to felicitate Industry- Academia collaboration and also initiation taken to create awareness and initiatives to promote green chemistry and engineering.

### **IGC Award Night**

Presenting the IGC award for outstanding research and initiatives in Green Chemistry and Engineering was an initiative to promote pollution prevention models. This award provided national recognition of outstanding chemical technologies that incorporate the principles of green chemistry into chemical design, manufacture, and use, and that have been or can be utilized by industry in achieving their pollution prevention goals. The award is meant to recognize outstanding contributions in green chemistry in the Indian industries. The IGC award was a unique opportunity for individual student or professor, research groups, institutes, government laboratories, universities, large scale Industries, MNC's, startup companies and small to medium scale industries. The IGC award recognized four individuals and organization and award were presented to one in each of the following categories:

- **Academicians:**

In this category total 7 Entries were received from IICT Hyderabad, CLRI Chennai, IIT-Kharagpur, Amritsar University and Goa University.

***Winner was IICT, Hyderabad, for their work on Technology for Enzymatic Degumming of Rice Bran Oil***

- **Student :**

In this category total 4 Entries were received from IIT-Bombay, ICT-Mumbai, Anna University and University of Rajasthan.

*Winner was Biosynth Group from IIT-B for their work on Biodiesel Synthesis from Waste Vegetable oil*

- **Startup and small to medium scale companies:**

In this category total 6 Entries were received from Deven Supercritical Ltd, Geist Research Pvt Ltd, Catapharma Pvt Ltd and Clean Sciences Pvt Ltd.

*Winner was Catapharma Pvt Ltd for their work on Catalytic Hydrogenation*

- **MNC and Large scale Industries:**

In this category total 9 entries were received from Atul Ltd, Dr Reddy's Laboratories Ltd, Jubilant Organosys Ltd, PI Industries and Lanxess Ltd.

*Winner was PI industries for their work on Technological Innovations in the Manufacturing Process of Phorate Technical*

The winners were felicitated by Prof Paul Anastas and Prof John Warner.

## **Day Two - 5th Dec 09**

### **Themes : Identification , Invention and Innovation**

The day was divided in 3 themes to comply with 9 I approach. The themes for day 2 were, Identification, Invention and Innovation

Day two was attended by almost 230 delegates which primarily focused on strategizing R&D activities for more greener and environmentally benign synthesis. It was aimed at Technical Directors, R&D Managers, Chief Scientists, CTOs, CXOs, etc, to identify the key industrial challenges, and view various paradigms emerging in the domain of Industrial Green Chemistry.

**Dr John Warner, President & CTO, Warner Babcock Institute for Green Chemistry,** delivered the key note address on “*Green Chemistry and Formulation Science.*” He deliberated on regulatory norms requirement, process modification and use of green chemistry for cost as well environmental benefits.

The theme session, **Identification**, was primarily to sensitize people to identify gaps in their existing process and how to overcome them by using green chemistry tools. The session was chaired by Dr John Warner. **Prof Paul Anastas** speaking on “*Towards a Molecular Design Strategy for Green Chemistry*” emphasized on designing of molecule to eliminate hazards at a molecular level.

**Dr John Peterson Myers, CEO of Environmental Health Science,** spoke on “*A Revolution in the environmental health sciences: New Challenges to safety of common chemicals in commerce.*” He brought out the environmental hazards of existing common chemicals on human health and environment and preventive measure that need to be worked upon. **Dr K V Raghavan** discussed development in catalysis in his talk “*Novel Catalytic systems for Green Chemical process Intensification*”

The theme session, **Invention**, was aimed to align participants, to strategize their invention in alignment with principles of green chemistry and engineering. The session was chaired by Dr Rakeshwar Bandichhor.

**Mr. Mark Dorfman, Biomimicry Guild,** in his talk, “*Biomimetic Green Chemistry Solutions: Achievements and outlook*” provided a detailed perspective and understanding on Nature’s chemistry and how we can mimic it to design environmentally benign synthesis.

**Dr N Sekar, ICT, Mumbai,** in his talk, “*Safe product design: perspectives from dyestuffs and intermediate industries*”, discussed how environmentally hazardous industries like dyes and pigments can also become environmentally friendly by safer synthesis and product designs.

Dr Rajender Varma, US-EPA, in his speech “*Greener pathways to organics and Nanomaterials; Sustainable applications of Nano Catalysts*” brought forth the emerging and cutting edge area of nanotechnology and its role in implementing green chemistry.

The final theme session of Day 2, **Innovation**, was to focus on green chemistry based innovations and new technologies emerging from the tool box of green chemistry and engineering. The session was chaired by Dr John Peterson Myers.

**Dr B Gopalan, CSO, Orchid Chemicals and Pharmaceuticals Ltd.**, in his talk, “*Water-The Greener Solvents for Organic chemists*” discussed the potential for water based reactions. **Prof G D Yadav, Director, ICT Mumbai**, in his speech, “*Innovation in catalysis as a tool for greener chemical products*” threw light on designing novel catalysts and increasing their activity to enhance reaction rates. **Dr S Ahmad** concluded the day with his talk on “*Green Nanotechnology.*”

### **Day Three - 6th Dec 09**

#### **Implementation, Industrialisation and Impact**

Day three focused on specific requirements of industries for implementing industrial green chemistry and thus elucidate ecological and economical impact concerning the process, production, project, operation managers, vice-Presidents etc., It was attended by almost 200 delegates.

**Dr Amy Cannon, Executive Director, Beyond Benign Foundation**, in her keynote speech, “*Green Chemistry: From the class room to Industrial Implementation*” discussed the importance of creating green chemistry and engineering awareness in young students.

The theme session, **Industrialisation**, was chaired by Dr Robert Peoples. This session aimed to deliver the benefits of green solutions implementations on ground level.

**Dr Pierre Woehl, Corning Inc**, in his talk, “*Efficient Processing with Advanced Flow reactor Technology*” highlighted on advanced flow reactor technology and how it helps to enhance Process intensification.

**Dr Shailendra Kumar Singh, Associate Head R&D., Jubilant Organosys Ltd.,** in his talk, *“Niacin : Vapour phase catalytic oxidation of Beta Picoline”* discussed the advantages and benefits of green technology over the conventional technologies.

**Dr G V Subbaraju, Senior VP of Aptuit Laurus Pvt Ltd.,** presented a case study of *“Green Technology for Esterification of Carboxylic acid”* and compared the green technology with existing technology..

The theme session, **Implementation**, was primarily to sensitize and make people aware about new concepts and technologies that individuals or organizations have used in spite of various barriers to implement green solutions. It was chaired by Prof Paul Anastas.

**Prof R K Sharma, Co-coordinator of GCNC, University of Delhi and Dr Alok Adholeya, Director, Bio-technology Department, TERI,** in their talk, *“Applications of microbe-plant-based-chemistry approach to address Bio energy and Bio remediation needs.”* discussed tools for bio transformations.

**Mr. Nitesh Mehta, Founder Director, Newreka Greensynth Technologies Pvt Ltd.,** spoke on *“Environpreneurship – a model to accelerate implementation of Green Chemistry.”* He presented an overview of Indian chemical Industry and academia scenario and how the bridging the gap through green chemistry based solutions can be advantageous to both Industry and Academia.

**Dr Kira Matus, Policy Analyst, Yale University,** in her talk, *“Understanding Innovation for sustainable development: A comparison study of Green Chemistry in the United States, India and China”* brought forth different dimensions of sustainability. She gave comparative study on US, India and China in green chemistry implementation barriers, policy regulations besides technology implementation barriers.

The final theme session, **Impact**, focused on policy regulations and implementation barriers for Green chemistry and engineering based technologies.

Mr. S G Choudhary, CT&SO, Tata Chemicals Ltd., in his talk, "*Process Integration for Greening the Footprint - Experience of Tata Chemicals* " spoke on how integration of end to end process reduces the carbon footprint.

The final presentation of the event was delivered by **Prof Anand Patwardhan, Professor SJM-SOM, IIT-Bombay**. In his talk, "*Policy Initiative to accelerate implementation of Green Chemistry*" he emphasized on governmental initiatives to accelerate green chemistry based solutions .

### **Panel Discussion**

The conference IGCW-2009 was concluded by panel discussion consisting of Prof Paul Anastas, Dr John Warner representing Green chemistry solution provider company, US, Dr Rajendar Varma representing US academia, Dr Kira Matus representing US Governmental and policy regulation Analyst, Mr. Nitesh Mehta representing a Green chemistry solution provider and Prof R K Sharma representing Indian academia.

The panel focused on bridging the gap between industrial and academic world with respect to perspective from both the worlds and how it could be utilized for implementation of Green chemistry and engineering based solutions. It also discussed green chemistry implementation barriers, policy regulations and other dimensions like human mindset apart from technology implementation barriers.

# Industrial Green Chemistry Workshop (IGCW-2009)



IGCW Inauguration



Welcoming Chief guest, Dr. T. Ramasami by Prof. Paul Anastas

Mapping Transformation Background Paper release



# Leading experts' presentations on IGC



Dr. T Ramasami



Prof. Paul Anastas



Dr. John Warner



Dr. Murali Sastry

Dr. Rajendra Varma



# Networking & visiting IGC Exhibitions



# Delegates' interaction with experts



# IGCW-2009 Welcomes all Chemical Industry

## EXHIBITORS

Standard Engineers Pvt. Ltd.

**Bayer**  
Bayer CropScience

**DOW**  
Dow Chemicals Int'l Ltd.

**warnerbabcock**  
Innovative for green chemistry

Green Chemistry  
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[www.rsc.org/greenchem](http://www.rsc.org/greenchem)

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**GEIST**  
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Chemistry in Nature

**ChemicalWeekly.com**

Speciality Chemicals  
DMG World Media

**Reaxa**  
Reaxa Ltd.

**DR. REDDY'S**  
Dr. Reddy's Laboratories Ltd.

## ORGANISERS

**NEWREKA**  
Newreka Green+Synth Technologies

Indian Chapter of American Chemical Society  
Green Chemistry Institute, University of Delhi, India

**ASSOCIATES**

**DOW**  
Dow Chemicals Int'l Ltd.

**LANXESS**

**Bayer**  
Bayer CropScience

**DR. REDDY'S**  
Dr. Reddy's Laboratories Ltd.

## SUPPORTERS

Center for Green Chemistry  
Green Engineering  
Yashwantrao Chavan Pratishthan

**warnerbabcock**  
Innovative for green chemistry

**ACS**  
Green Chemistry Institute

Ministry of Science & Technology  
(MST)

Department of Chemical Engineering  
IIT Bombay

## PARTNERS:

Speciality Chemicals  
Magazine

Green Chemistry  
Leading Journal  
in the field  
[www.rsc.org/greenchem](http://www.rsc.org/greenchem)

Green Chemistry  
LETTERS

**ChemicalWeek.com**  
The Chemical Network

**ChemicalWeekly.com**

**CHEMICAL WEEK**  
Specialty Chemicals

december 4, 5, 6  
mumbai, india

**IGCW**  
2009  
industrial green chemistry  
workshop

RENAISSANCE HOTEL  
THE CONVENTION CENTER  
MUMBAI, INDIA

## ORGANIZERS:

**NEWREKA**  
Newreka Green+Synth Technologies

**GCNC**  
Green Chemistry Network Center (GCNC)  
Indian Chapter of American Chemical Society-  
Green Chemistry Institute, University of Delhi, India

## CO-ORGANIZERS:

**Chemical Industry Digest**  
Blockdale Publications, Mumbai, India

## OUR ASSOCIATES:

**DOW** **LANXESS** **DR. REDDY'S** **Bayer**

industrial green chemistry

2025  
2023  
2021  
2019  
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1900 1950 2000

[www.IndustrialGreenChem.com](http://www.IndustrialGreenChem.com)

**IGCW**  
2009

## SUPPORTERS:

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**ACS**  
Green Chemistry Institute

Ministry of Science & Technology  
(MST)

Department of Chemical Engineering  
IIT Bombay





PI Industries receiving award



Cata pharma receiving award



Biosynth group receiving award



IGCW cocktail dinner night



## Panel discussion



IGCW panel discussion team



Mr.Nitesh Mehta



Delegates' interaction with experts



Dr.John Warner



Prof.R.S Sharma