

**1<sup>st</sup> Industrial Green Chemistry Workshop, Mumbai**

# Industrial Green Chemistry can make the Chemical Industry safer, greener, more profitable and deliver the benign public face

**Position Paper titled 'Mapping Transformations' prepared by Knowgenix released.**

The essence of this 3 day workshop held from 4<sup>th</sup> to 6<sup>th</sup> December 2009 at Hotel Renaissance, Powai was that industrial green chemistry is an idea whose time has come. Those who practice it now will benefit immensely from the first mover advantage. This event coincided with 25<sup>th</sup> anniversary of the horrific Bhopal gas tragedy which accelerated the green chemistry initiatives in the world.

Addressing a gathering of over 300 delegates of CEOs, industry experts, engineers and scientists from the chemical and fine chemical industries at the Industrial Green Chemistry Workshop, **Chief Guest Dr T Ramasami**, Secretary Dept of science and Technology, Government of India said that this industrial green chemistry initiatives should turn into a mass movement. For this the initiative should come not only from the chemicals' manufacturers but from the demand side consisting of user industries, consumers and the general public, Dr Ramasami stated.

While green chemistry events are held around the world regularly, this is the first time that a workshop on 'industrial' green chemistry is being held. For this a relevant terminology with the word 'industrial' has



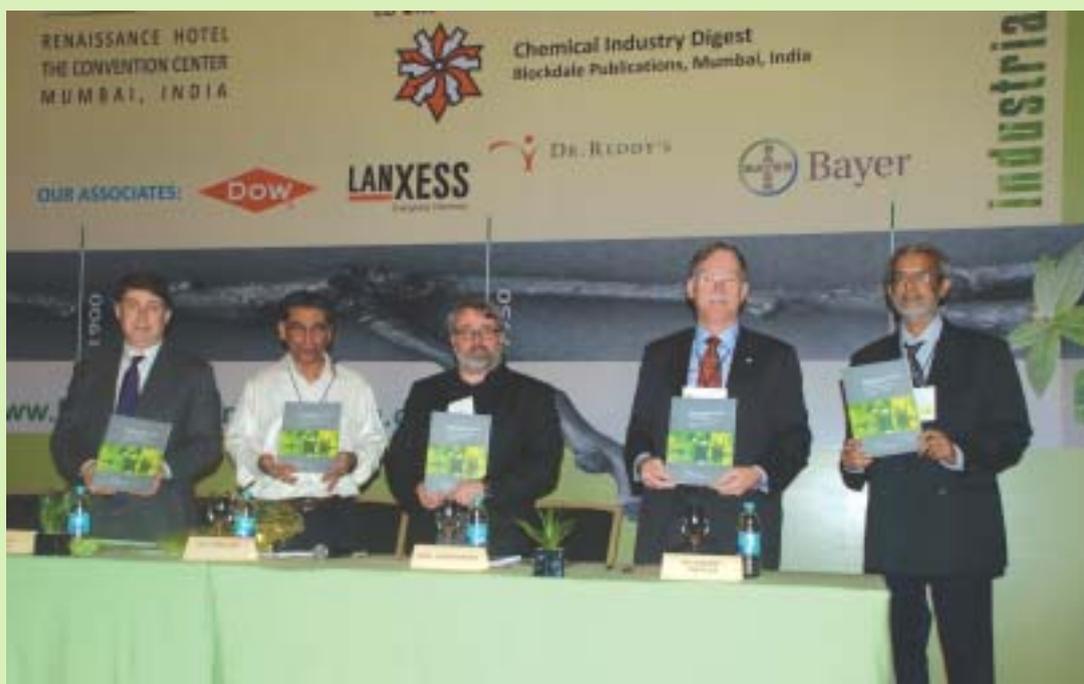
**Traditional opening of the Industrial Green Chemistry Workshop.**

(L-R) Nitesh Mehta, Director, Newreka GreenSynth Technologies; Dr Bob Peoples, Director of American Chemical Society; Dr John Warner, President & CTO, Warner Babcock Institute for Green Chemistry, USA; Prof Paul Anastas, Director, Centre for Green Chemistry and Green Engineering at Yale USA and Dr T Ramasami, Secretary, Department of Science & Technology, Government of India.

been coined so that green chemistry goes beyond academic pursuits into the realm of industrial practice.

## Government will support industry initiatives on zero emission

Dr Ramasami exhorted industry captains to come up with specific action plans specific to chemical in-



Position Paper 'Mapping Transformations' by Dr R Rajgopal, CEO, KnowGenix (*extreme right*) being released. (L-R) Prof Paul Anastas, Dr T Ramasami, Dr John Warner, Dr Bob Peoples & Dr Rajgopal.

dustry segments including research initiatives for zero emissions, which he said the government will fully support. In 2004, Dr Ramasami said that the Government of India had set up the Special Task Force for Green Chemistry in the country under which process research initiatives for zero emissions would be fully funded by the Government. Emphasizing the importance of making green processes, industry relevant, Dr Ramasami said that what is acceptable on a micro



Dr K V Raghavan, Distinguished Professor, IICT, delivering his lecture on novel catalytic systems

scale in the laboratory may become unacceptable at the industry scale as the volume of waste also goes up. It is important to revisit all existing processes, he advised, to assess whether the processes were clean, whether waste is avoided or minimized and whether the economics of the process could be improved. The complacent attitude of not improving the process simply because process is working is no longer sustainable. It is time we went for best cost solutions and not least cost solutions, he commented. He gave examples of how the Central Leather Research Institute

which he headed developed green chromium processes that helped tanneries in the wake of Supreme Court orders to close down polluting tanneries.

## Position Paper

A position paper prepared by KnowGenix titled 'Mapping Transformations' on Industrial Green Chemistry & Technology was released on the occasion. The position paper has analysed the transition and evolution of green chemistry against the backdrop of the technological framework. It presents the key aspects of integrating green chemistry and technology into industrial practice with a resume of emerging enabling technologies.

Earlier in his welcome address, **Nitesh Mehta, Convenor of the Industrial Green Chemistry Workshop and founder Director of Newreka Green Synth Technologies** explained the importance and the benefits through competitive thrust that green chemistry could deliver to industry. He pointed out the unacceptably high waste generated by the drugs & pharma and other fine chemical industries for which today solutions are very well possible through green chemistry with better economics and profitability. He said that one of the objectives of this event is to debunk the myth that green chemistry will add to the cost; on the contrary he said that several case studies in the event would prove just the contrary.

What was of great importance to the event was the active participation and leadership from the leading doyens of green chemistry of the world: Prof Paul Anastas and Dr John Warner, considered as the fathers of green chemistry, Dr Bob Peoples, Director of the American Chemical Society, Dr John Peterson Myers, CEO & Chief Scientist, Environment Health Services, USA; Dr Kira Matus, Sr Policy Analyst, Centre for Green Chemistry and Green Engineering at Yale University, USA and several leading scientists from India: Prof GD Yadav, Dr K V Raghavan, Dr Alok Adholiya and many others.

### Embrace Green Chemistry Now for first mover advantage

**Prof Paul Anastas** in his address stressed on the urgency in embracing green chemistry. He said that all along the drivers towards sustainable manufacturing was due to regulatory pressures and growth is characterized by unsustainability. This, he said, had to change. By following the twelve principles of green chemistry that he and Dr John Warner had enunciated, incidents like Bhopal need never take place, Prof Anastas contended. According to him, through innovative chemistry and chemical engineering, chemicals manufacturing can be greener and safer and at the same time advance competitiveness. He displayed through several examples how we could learn from and mimic nature, simulate nature wherever possible to develop green products. Other issues that need to be addressed are on alternative energy, reutilization of green house gases, using CO<sub>2</sub> as feedstock and addressing the issue of resource depletion.

**Dr John Warner** articulated the incredible business opportunities that can be realised from the design and development of safe materials. He said that green chemistry was catching up very fast now and in ten years green chemistry will become very common. So those with vision and foresight who start practicing green chemistry now will have the first mover advantage. In this very competitive world we are in, where driving down costs is essential even to survive, one had to eschew hazardous and dangerous materials and difficult chemistries which made chemical production far costlier. Green chemistry is safer, performs better and reduces costs. What remains to be done is to create it more and more for which he exhorted scientists, through various examples to look at atom efficiency and economy, processes at the molecular level



**Prof G D Yadav, Director, ICT speaking on Innovations in Catalysis**

and at new stable compositions of matter.

**Dr Murli Sastry, Chief Scientific Officer of Tata Innovation Centre** who is one of the leading nanotechnology scientists described the work on bio synthetic pathways and enzymatic processes particularly at the Centre.



**Dr Amy Canon, Executive Director, Beyond Benign speaking on Implementation of Green Chemistry**

## Absorbing Presentations and Case studies

**Dr Bob Peoples** said that Green Chemistry means business and showed how pharma round tables consisting of activist companies in green chemistry are advancing this cause. The process of greening, he emphasized, is a continuous process and would range from incremental improvements to breakthrough innovations. What is important is that the practice starts in whatever way one can implement. All the 12 principles of green chemistry may not apply but even if 3 or 4 can be applied, it is good enough for a start. He reminded the audience that the UN has designated 2011 as the year of chemistry. There is a sustainability tsunami sweeping the planet and no more can chemical industry continue with practices that are unsustainable, he warned.

**Prof G D Yadav and Dr K V Raghavan** spoke on how novel catalysts are effective tools for greening chemical products and processes and for process intensification. On the roadmap for the implementation of green chemistry, **Dr Amy Canon**, Executive Director of Beyond Benign, a Warner Babcock Foundation Institute said that green chemistry, must start from our educational systems and extrapolate into industry for effective implementation.

**Dr Kira Matus** gave a comparative study of the status, awareness implementation and policy initiatives in the US, India and China.

**Dr R Rajagopal**, CEO of KnowGenix, Mumbai said that green chemistry & technology platforms should be looked at holistically so that strategies for its implementation can be practical, avoiding and overcoming the barriers and difficulties that are bound to crop up.

Other very absorbing presentations included:

- On Innovation as the Driver of Green Chemistry Advances in the Pharmaceutical Industry by Dr

Joseph D Armstrong, Senior Director, Process Research, Merck & Co Inc, USA.

- On Pharmaceutical Industry as an Epicenter of Green Chemistry: A Perspective by Dr Rakeshwar Bandichhor, Senior Scientist, Centre for Excellence, Dr Reddy's Laboratories Ltd, India.
- On a revolution in the environmental health sciences: New challenges to the safety of common chemicals in commerce by Dr John Peterson Myers, Founder, CEO & Chief scientist, Environment Health Scientists, USA.



**Dr Kira Matus, Sr Policy Analyst, Center for Green Chemistry & Green Engineering at Yale University, USA compared the scenario on green chemistry in the USA, China & India**

- On Greener Pathways to Organics and Nanomaterials: Sustainable Applications of Nano-Catalysts by Dr Rajendra S Varma, Senior Scientist, Sustainable Technology Div., National Risk Mgmt, Laboratory, US Environmental Protection Agency, USA.

- On Efficient Processing with Advanced Flow Reactor Technology by Dr Pierre Woehl, Associate Head, R&D – Organic, Jubilant Organosys Ltd, India, amongst several others.

The three day workshop was power packed till the conclusion with a prolific stream of powerful presentations, case studies and industry examples. A very interesting and lively Panel Discussion more or less concluded the event.

There was a mini exhibition alongside the workshop. Industrial Green Chemistry awards were also distributed at the end of the first day.

The event was organized by Newreka GreenSynth Technologies and the Green Chemistry Network Centre with Chemical Industry Digest as the co-organiser.



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