NANOGLOBE
Creating Leadership in NanoTechnology R & D and Business

Promoting the Adoption of Nanotechnology in Singapore Manufacturing Industries

Seminar on Nanotechnology in Manufacturing

Abstract:

Half-day seminar on Nanotechnology in Manufacturing has attracted over 150 participants who are interested in learning about the vision, technology development and application of nanotechnology in manufacturing processes enable better, cheaper, greener and smarter processes, products, and services. This timely seminar provided not only an overview about the nanotech related research activities at SIMTech, and overview about nanotechnology applications and commercialization worldwide, but also featured some specific technologies that enable greener and more precise manufacturing techniques, namely Atomic Layer Deposition (ALD), Atomic Precise Manufacturing (APM) and Nanostructured Surface Functionalities via Biomimetic Nanoimprinting. Although this seminar was meant for only Singapore community, we were privileged to have Beneq's Asia Sales Director from Finland and Zyvex's Founder and Chairman from the United States, in addition to Singapore's nanotechnology players: Institute of Materials Research Engineering (IMRE) and NanoGlobe.

The Singapore nanotechnology community once again gathered together in a half-day seminar of "Nanotechnology in Manufacturing", organized by both the Singapore Institute of Manufacturing Technology (SIMTech) and NanoGlobe. Supported by the International Enterprise (IE) Singapore and Singapore Venture Capital & Private Equity Association (SVCA), this event was held on 9 June 2010 at SIMTech Auditorium, attended by over 150 participants half of whom are from local industries. Along with similar vision, the National Nanotechnology Coordination Office (NNCO) of the United States has identified their new signature initiatives for 2011 that include sustainable nanomanufacturing. The program of the event can be found at the www.nano-globe.biz/events.html.

Singapore scientists and industry leaders have been developing nanotechnology that enables cheaper, greener and smarter manufacturing processes that are already practiced in industry today. The purpose of the seminar was to provide an overview of SIMTech's Nano Manufacturing activities, an overview on the-state-of-the-art manufacturing technology, nanoimprint lithography that creates bio-inspired functional structures, high performance CNT enhanced composites, the vision of atomic precise manufacturing, and atomic layer deposition & aerosol technology for functional thin film production.

Nanotechnology has been adopted well in SIMTech's research activities in manufacturing technologies covering machining, joining, forming, and surface functionalities, as well as in metrology, as described

by Dr Sun Zheng, Deputy Group Manager of SIMTech. Laser fabrication and nanobump arrays, lead-free nanofillers solder composite, nano-size powders of powder injection molding, superhard nanocomposite PVD coating and photocatalytic TiO2 nanoparticles coating are a few examples where nanotechnology is being incorporated in manufacturing technologies developed by SIMTech. The seminar was also part of preparation steps for SIMTech to launch Nanotechnology in Manufacturing Initiative (NIMI), of which the first roundtable discussion was already organized last April 2010 (refer to our article: http://www.nanotech-now.com/columns/?article=453). NIMI is planned to be launched in October 2010.

In addition to the adoption of nanotechnology in local manufacturing technologies development, it is exciting to learn that there are plenty of companies, big and small; matured and start-up, have been engaging their business in nanotechnology, from carbon nanotubes, metallic nanoparticles, nanocomposite, to atomic based platform technologies for electronics & displays, clean energy, lightweight construction, consumer goods and health care applications. “It is important to keep looking out what are already available in the market, how to differentiate ourselves, and collaborate with other companies to accelerate the adoption of nanotechnology in industry today and tomorrow”, said Dr Lerwen Liu, Managing Director of NanoGlobe when sharing her insights gathered during her nano world tour.

Focusing on the applications instead of the equipment, Mr Juha Tanskanen, Asia Sales Director, shared the research and business activities of Beneq Oy from Finland. Beneq was established in 2005, commercializing their proprietary technologies in thin film production namely ALD and Aerosol Coatings Technology. Due to the ability of forming a film at one atomic layer at a time, ALD provides many advantages including extreme surface conformality, pinhole free, dense and smooth film. Beneq’s aerosol coating technology proves to be competitive for producing transparent conductive oxide coating with visible transmittance of >80% and sheet resistance of ~10 ohm/sq at haze condition of ~10%. Besides manufacturing the equipment itself, Beneq is actively working with their partners and customers to develop the appropriate process for any particular applications worldwide.

It was great to also have Mr Jim von Ehr in this seminar, one of the visionary nanotechnology leaders in the world. Jim shared his vision on Atomic Precise Manufacturing (APM), along with the description of the research and business activities in his company he founded, Zyvex. Jim envisioned that APM will be the ultimate technology to build anything actively and precisely to the atomic level of precision. In time yet to come by learning from active approaches of nature, he envisioned machineries capable of selecting particular atoms and molecules and building the required structures, components and products designed precisely for the required properties.

Having similar approach of learning from nature, another exciting technology is going on in Nanoimprint Group of Institute of Materials Research and Engineering (IMRE), led by Dr Low Hong Yee. Instead of having additional materials or coatings to provide surface functionalities, Dr Low implements nanoimprint technology directly to create functional surface structures to be nanopatterned surface imitating the structure of nature – biomimetic functionalities via nanoimprint. For examples, the structure of rice leaf can be used to provide anisotropic wetting and the structure of gecko foot can be used to provide dry adhesive coating. We believe that nanoimprint technology gives significant contribution to the clean technology movement.

Under Dr Low's leadership, the Industrial Consortium on Nanoimprinting (ICON) will be launched in Singapore in August 2010 to also promote nanomanufacturing activities in Singapore industries.

We are encouraged by the enthusiasm of Singapore nanotechnology community to learn about nanomanufacturing and support its development. The seminar has served as one good venue to outreach the community in educating, inspiring, and facilitating the adoption of nanotechnology further in manufacturing processes to eventually result in sustainable nanomanufacturing.

Half-day Seminar on Nanotechnology in Manufacturing, organized by SIMTech and NanoGlobe, 9 June 2010

Speakers of the Seminar (left to right): Dr Lerwen Liu, Dr Sun Zheng, Dr Low Hong Yee, Mr Juha Tanskanen and Mr Jim von Ehr