

OECD Addressing Business Environment for Nanotechnology – Part 1

Insight on OECD WPN Workshop on Nanotechnology for Sustainable Energy Option & Challenges in the Innovation Environment of Nanomedicine, Feb. 22-23, 2010, Seoul, South Korea

Abstract:

This article introduces the current policy efforts on nanotech commercialization related policy of ISO, IEC, OECD and United Nation. We highlight key issues related to nanotechnology commercialization challenges discussed in a recent workshop organized by OECD Working Party on Nanotechnology (WPN) on Nanotechnology for Sustainable Energy Options and Challenges in the Innovation Environment of Nanomedicine. THE OECD WPN launched a unique initiative on Nanotechnology business environment in 2007 and has identified challenges in R&D, human resources, financing, IP management, value chains and production, public perception, and EHS issues which need to be further explored in its more in depth case studies in order to prepare a comprehensive policy recommendation report.

Working everyday on commercialization of nanotechnology related matters, I was happy to participate in the recent Organization for Economic Co-operation and Development (OECD) nanotech workshops organized by its Working Party on Nanotechnology hosted by the Korean Institute of Science and Technology (KIST) in Seoul during Feb. 22-23, 2010. In addition to help moderating discussions at the workshops, we also helped bring speakers from non member economies in Asia including China, Chinese Taipei, Singapore, Thailand, and Vietnam to share experiences in nanoenergy and nanomedicine developments.

Nanotech companies have become increasingly concerned about standards and safety issues which would affect its R&D strategy and product development and sales. Overall it is about developing a sustainable business enabled by nanotechnology. Global organizations and their members and observers have been actively engaging in nanotech standardization and environment, health and safety (EHS) issues. OECD launched its nanotechnology initiative Working Party on Manufactured Nanomaterials -Safety of Manufactured Nanomaterials (www.oecd.org/env/nanosafety) in 2006 to promote international co-operation in EHS aspects of manufactured nanomaterials and subsequently formed the Working Party on Nanotechnology (www.oecd.org/sti/nano) in 2007 to address the business environment for nanotechnology. Separately, the International Organization for Standardization (ISO) established June 2005 the ISO TC229 "Nanotechnologies" (<http://isotc.iso.org/livelink/livelink?func=ll&objId=8927752&objAction=browse&sort=name>) focusing on nomenclature and terminology and International Electrotechnical Commission (IEC) set up in June



2006 the IEC TC113 Nanotechnology Standardization for Electrical and Electronic Products and Systems (http://www.iec.ch/dyn/www/f?p=102:7:0::::FSP_LANG_ID,FSP_ORG_ID:25,1315). In Dec. 2009, United Nation APCTT-ESCAP organized its first “Consultative Workshop on Promoting Innovation in Nanotechnology and Fostering Its Industrial Application: An Asia - Pacific Perspective” with focus discussion on enabling the developing world with nanotechnology industrialization capability. The Asia Nano Forum (ANF, www.asia-anf.org) that connects 15 economies in the Asia Pacific region are currently actively working with OECD, ISO and IEC to ensure the standardization and EHS issues are properly addressed and coordinated within the regional and globally.

OECD (www.oecd.org) is a forum where the governments of 30 member countries work together to address the economic, social and governance of globalization as well as to exploit its opportunities. South Korea and Japan are the two OECD Asian member countries. The aim of OECD Working Party on Nanotechnology (WPN) is to examine the business environment for nanotechnology through identifying opportunities and challenges for nanotechnology commercialization and to propose policy recommendations addressing specific challenges in selected application fields. The WPN has conducted case studies involving 51 companies across 17 countries and has identified challenges for companies in developing, adopting and commercializing nanotechnology in areas including research and development; human resources; finance; intellectual property; value chains and production; in public perception; and EHS aspects. This year, WPN intends to deepen the analysis of the case studies undertaken previously and to explore with some companies in more depth the challenges and possible policy actions in selected application areas in (i) sustainable energy and (ii) nanomedicine. The leading member countries in the WPN are Australia (Enabling Technologies Policy Section within the Department of Innovation, Industry, Science and Research), Germany (Nano-Initiative - Action Plan 2010 headed by BMBF) and Korea (KIST). Korea is one of the most active countries in nanotechnology commercialization and generously offered to host and sponsored the WPN workshop during Feb. 22-23, at its leading nanotech R&D institute Korean Institute of Science and Technology (KIST).

The workshop gathered 80 invited participants from OECD and Non OECD member economies including Austria, Australia, Canada, China, France, Germany, Israel, Italy, Korea, Japan, Russia, Singapore, Taiwan, Thailand, and Vietnam. The event has a stronger Asia presence being hosted by Korea, interesting issue raised on cooperation between the developed and the developing world especially in the area of IP Management, Infrastructure Access, Human Resource Development, and Public Perception. Nanotechnology applications in energy include production, storage, conservation and transportation. Nanotechnologies enabling sustainable energy options discussed in the workshop include LED, PV, Fuel Cell, Battery Materials for Electric Vehicles (Nano Carbon), Light Weight Composite Materials (CNT), Low Cost Manufacturing Process (low Temperature and low cost printable



process) and ITO Replacement (Ag, CNT, ZnO). Applications of sustainable energy options such as zero emission building + smart grid, electrical scooters presented by Taiwan representative are particularly impressive. Taiwan targets, by 2025, 15% of installed capacity should be contributed by renewable energy. And Australia and Germany mandate that by 2020, 20% of electricity will come from renewable energy source.

Presentations in the workshops were given by good mixture of government and consortium representatives, multinational company, SME, start-ups and research institution executives providing diversified perspectives of nanotech commercialization opportunities and challenges. There is no top down nanotech specific commercialization policy; and most industry speakers concluded on the same recommendation to the government to push the adoption of nanotech enabled solutions/products and this would help the growth of nanotech industry and adoption of nanotechnology in existing business. In the case of energy, solar cells and LED were given as examples.

To me the German government has the most developed policy in supporting emerging industry. Germany OECD representative Dr Gerd Bachmann shared German government's integrated policy in developing renewable energy generation and examples of nano-energy development especially various nanomaterials for high efficiency solar cells. Dr Bachmann emphasized that "An interconnected network of Politics, economy, society/environment is important for energy development for energy supply chain". Bayer representative Dr Peter Krugger, who is currently managing the mega project "Innovation Alliance Carbon Nanotubes" (www.inno-cnt.de) with 80M euros (50% from Germany's Federal Ministry for Education and Research - BMBF) involving 80 partners from industry and academics, presented the CNT applications in the energy value chains and its integrated approach in managing sustainable development of nanotechnology. Dr Krugger stresses that "Nanotech is an Enabling Technology along the whole industry value chain from components/nanomaterials to device and system. We focus on CNT application in energy conversion, transport, storage, saving. All players in the value chains need close collaboration".

In terms of infrastructure support for nanotech business environment for renewable energy application, the most impressive example is the Korea Advanced Nano Fab Center (KANC). Driven by its ambition to be the top 3 world leading nanotech power by 2015, Korean government is investing heavily in nanotech development with strategic industry and international partnerships. KANC is a 200MUSD government invested state of the art nanotech characterization and fabrication facility, to me the largest nanotech facility center in Asia, focusing on III-V compound semiconductor for PV devices application (reached efficiency reached 25.58%) and LED in partnership with Seoul semiconductor, Samsung and LG in the area of nanoenergy.

USA based nanotech company CIMA Nanotech (www.cimananotech.com) which also has an office in Singapore and R&D and manufacturing in Israel and Japan shared with the participants a unique international business model, international network/biz relationships and its “picket fence” IP management strategy.

The panel discussions moderated by myself (Lerwen Liu) in the two afternoon sessions served as a platform for panelists and participants to provide further inputs/recommendations on the nanoenergy and nanomedicines commercialization challenges covering

- Research and technology policies
- Technology transfer
- Industry awareness of nanotechnology/ of nanomedicine
- Finance/ venture capital
- Strategies to decrease market uncertainties
- Competitive pricing
- Human resources policy
- Capacity building and skills development policy
- Risk governance
- Regulatory aspects – policies impacting industry
- Perceptions by the public and other stakeholders
- Intellectual property issues
- Standardisation and definitions
- Challenge of covering the full value chain (from R&D to production and sales) - nanotechnology has to compete with existing technologies
- Fiscal measures (e.g. tax credits)
- SME issues (finance, value chain, partnerships, credibility, etc)
- Communication between stakeholders (companies, public sectors, tech/non-technical, etc)

Public perception of nanotechnology was discussed repeatedly during both workshops, the panel recommended the need of transparent and international harmonized guidelines for various nanotech sub-areas including nanoenergy and nanomedicines. CEO of Cima Nanotech Mr. Jon Brodd shared, that “You cannot sell technology, it is perceived values that sells”. He also stressed that “The most significant threat to the future of nanotechnology is not in regulation but in public perception”.

We will discuss in Part II in more details about the workshop discussions, inputs and recommendations given by representatives from participating member and non-member economies.



Dr Peter Krugger, Head of Bayer Working Group Nanotechnology, Bayer MaterialScience represent Germany presenting its full industry value chain program Innovation Alliance Carbon Nanotubes co-funded by German government BMBF.



Dr Ryuichiro Maruyama, Program Officer of Council for Science and Technology (CSTP) and Researcher of Advanced Materials Laboratory of Sony, Japan presenting Sony experience in nanotechnology commercialization in developing DSSC, Printable technology, Fuel Cells and Sony Science Program for public engagement.



CEO of Cima Nanotech Mr. Jon Brodd representing Singapore and USA presenting Cima Experience in global business strategy and picket fence IP management.