Nano Science, Technology and Industry Scoreboard

Lessons from Ten Years of Nanotechnology Bibliometric Analysis

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Researchers of Georgia Institute of Technology, program in Science, Technology, and Innovation Policy (STIP), and Center for Nanotechnology in Society at Arizona State University (CNS-ASU) summarizes their 10-year experiences in understanding, characterizing, and conveying the development of nanotechnology research and application in a chapter of book titled "Nanotechnology Environmental Health and Safety: Risks, Regulation, and Management (Third Edition)".

This chapter has discussed the types of strategic information and analyses that a program of a multidisciplinary social science center can produce to enhance the understanding of development of a science-driven technology. The program yielded a number of innovative methods for understanding the emergence of nanotechnology, including web scraping of small and medium-sized company websites, visualizations of patent and publication portfolios and geographic clusters, and methods for understanding innovation pathways.


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The STIP group advanced knowledge about nanotechnology commercialization in the United States and internationally, not only through bibliometric and patent analysis methods but also through the creation of a nanotechnology corporate

panel dataset. A corporation was included in this panel by virtue of its having had nanotechnology publications authored by or coauthored by an individual in a corporate enterprise and/or by virtue of having a nanotechnology patent assigned to that corporate entity.

They used this information about research and companies to delve into several specific nano-enabled application areas:

1- An energy technology (dye-sensitized solar celled DSSCs)

2- A biomedical technology (nano-enabled drug delivery NEDD), reaching into study of its roles in cancer treatment, and further into brain diseases

3- A general purpose technology - graphene

4- Applications of nanotechnology in the building construction sector

Analyses of these application areas suggest that the path to adoption of nano-enabled commercial applications is not smooth. In graphene, the discovery to application cycle is accelerated and rapidly globalized, but growth patterns vary in different application areas. Drug delivery follows a pattern in which nano-enabled delivery platforms are grafted onto current pharmaceuticals, rather than leading to codevelopment or multifunctional approaches. Likewise, DSSCs offer unique advantages but compare less favorably with incumbent technologies on energy conversion efficiency and long-term stability. The building construction sector could benefit greatly from manufactured nanotechnology products but although awareness of these products is higher than expected, adoption of these products is limited by difficulties in applying new nano-enabled products to the existing building construction project management systems.

For more study, the full text of the report are available here.