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Nanobiotechnology in India: Have we traversed beyond a myth?

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Nanobiotechnology in India: Have we traversed beyond a myth?

The rapid development of the science of nanotechnology and the diversity in its potential applications have attracted the attention of governments around the world to generously fund nanotechnology research over the last few decades, with the fond hope of harvesting commercially viable technologies for the benefit of humankind.

The government of India in 2001 ventured into this domain with the Nanoscience and Technology Initiative (NSTI) as a mission mode program in the Tenth Five Year Plan (2002-07) with a budget of approximately `60 million, followed by the Nano Mission with a handsome `10 billion allocation for the next five years that were to come.

The Department of Science and Technology (DST) as the nodal agency in the Eleventh Five Year Plan (2007-12) had about `193 billion for the creation of centers of excellence in nanotechnology, with state-of-the art infrastructure and skilled human resource for the establishment of nanotechnology in India.

Additionally, nanotechnology has also been funded by the Department of Information Technology (DEITY), Defence Research and Development Organization (DRDO), Department of Biotechnology (DBT), Department of Atomic Energy (DAE), Council for Scientific and Industrial Research (CSIR), Indian Council for Medical Research (ICMR) and Ministry of New and Renewable Energy. Industry in India has by and large been a bystander and observer without significant involvement in nanotechnology.

Recent publications on the status of nanotechnology in India from the CSIR Institution NISTADS (CSIR-NISTADS POLICY BRIEF -II, July 2012) has demonstrated that India trails significantly behind China in its share in the global publications including citation of publications from India on fields related to nanotechnology.

Publications in nanobiotechnology from India are only beginning to emerge. However, the translation of nanobioscience into

promising technology should result in filing of patents, if commercial interests are to be protected.

India's patenting performance in nanobiotechnology has been dismal as compared to countries such as China and Korea.

Despite the generous funding by various departments of the government of India in all fields of nanotechnology, and some of the best minds involved in this exciting field, why has India not been able to keep its head above the global and regional nanowaves?

This is even more surprising as India has always demonstrated its grit and determination with confirmed delivery whenever projects were tackled in a "mission mode", be it nuclear energy, space exploration and applications, communications or polio eradication.

If India continues to take such "nanosteps" at a "nanopace" in this fast moving field, it will not only have "missed the bus" situation, but will continue to trail the world as followers in an ever widening gap with time. An immediate mid-course correction with a determined focus is therefore an imperative.

The "national nano-mission mode" has to adopt a working model that interlinks the relevant stakeholders in real time to synergistically work in unison to scale up adaptations to integrate with the nano value chain with minimum time-lag from concept-to-market.

Only then, the creations will find successful translation to the markets as products and processes. Further, the planning team must have participation of creators from the academic world and convertors of science to commercialize technology from the industrial world.

Needless to mention that timely and strategic production of patent portfolios with freedom to operate would be an inherent necessity.

Specifically in nanobiotechnology, India ought to focus on its strength and work on a "national consortia mode" with full accountability of the participating partners (generally lacking) for:

- Synthesis of newer functionalized nanomaterials with targeted purposes such as drug delivery, both for prevention and control of selected diseases
- Diagnostics kits / devices and processes involving nanoscience
- Materials to act as blood substitutes
- Regenerative medicine
- Materials and processes for enhancing agricultural productivity

Some of the national institutions such as Technology Information, Forecasting and Assessment Council (TIFAC) and National Institute of Science, Technology and Development Studies (NISTADS) should be contracted with targeted job of preparing the patents landscape in these fields with detailed mapping of the patented technologies.

This will enable a strategic planning of the projects to be undertaken at the national level so that the work done subsequently by the project teams can be objectively reviewed for their patent ability for the creation of "national patent portfolios", giving the government and the industrial stakeholders the needed operating space for negotiating licensing deals, joint ventures, and their like. This therefore demands a shift from the mere "ivory tower planning modes".

About the Author:

Professor Prabuddha Ganguli is currently the advisor of VISION-IPR in Mumbai. He obtained his MSc in chemistry from Indian Institute of Technology (Kanpur), PhD in Chemical Physics from Tata Institute of Fundamental Research, Mumbai, and completed his post doctoral research in Germany and Canada. He was a Visiting Scientist at the Bhabha Atomic Research Centre in 1981 before joining Hindustan Lever Ltd as a research scientist.