EXECUTIVE SUMMARY

Indian S&T is passing through a critical phase. From Science Policy to Technology Policy and then integrating both, the new Science, Technology and Innovation Policy (STIP 2013) has been announced by the Government of India. There is now an urgent need to invigorate the S&T led solutions for successful deployment in the economy or society of the country. In the entire game of innovation, the role of new materials and their processing need not be over-emphasized.

The present project involving a pilot study undertaken to examine the status of innovations in the area of New Materials and their Processing being pursued by the R&D laboratories, academic institutions and industries in and around Kolkata and to identify pitfalls is meant to chalk out a better road map for the purpose.

Towards this, a survey has been conducted among a few individual experts, faculty members of Universities and IIT - Kharagpur, R&D personnel of two reputed industries and senior scientists of three CSIR laboratories in and around Kolkata region. Information was also collected from the Patent office at Kolkata. A workshop was organized on the subject. In the Workshop, key note speakers were invited to talk about their views on innovation. There were about one hundred and seventy delegates and some of them presented the outcomes of their R&D activities. A special session was also arranged for interaction with young participants.

A carefully prepared questionnaire was canvassed amongst the individuals and institutions visited to elicit relevant data as well as opinions.

Items of information, thus obtained from different sources, have been compiled for analysis. Unfortunately, it has been observed that majority of the persons are not aware of the Science, Technology and Innovation Policy (STIP) 2013 of the Government of India. During interaction, the main theme of the policy has been explained to them and their views were sought. Many persons, mainly from academic institutions, have different opinions on the definition of innovation. Some have opined that innovations of high impact in society and economy may not be necessarily based on high quality S&T.

Academic institutions prefer publications of their research outputs. R&D laboratories work for development of new technologies but they feel that majority of them remain within the laboratories for lack of interest from the industries and bureaucratic method of technology transfer procedure.

There are many factors which explain why R&D centres do not have a satisfactory record on innovations. Those include : a poor subjective horizon, competition with imported technologies, inadequate returns on efforts, poor laboratory records, thrust on science, lack of focus and a sense of mission, lack of trust and, consequently, opposition, lack of commitment and strict decision making, inadequate networking with other laboratories and the industry, poor definition of deliverables, absence of a carrier chain to take inventions forward, cost of R&D, poor facilities for scae up, bureaucracy, problems with patents, lack of mandates on innovation etc. These have been discussed in some detail in Section 3.3.

The R&D outputs of different organisations have been examined in line with the theme of STI Policy 2013. However, as observed even in the globally developed countries, conversion of R&D output from conceptualization to a successful and beneficial technology passes through different stages of development that require long time, sometimes in the order of ten years or more. Therefore, the R&D outcomes of different organization have been categorized in three groups – a) technologies transferred to industries, b) technologies supposedly ready for transfer and c) technologies under progress and having potential for industrial application.

The technologies under the first category include the following:

Category (a)

CSIR-NML

1. Synthetic nanocrystalline Hydroxyapatite.
2. Synthetic nanocrystalline Hydroxyapatite and β-Tricalcium phosphate composite.
3. Technology for production of rare grade nano iron oxide from waste pickle liquour.
4. Technology for recovery of lead from zinc plant residue.
5. Technology for production of tungsten metal powder from hard tungsten carbide scraps.
6. Technology for nickel recovery from spent catalysts.

7. Wide metallic glass ribbon processing unit.
8. Magstar : A device for nondestructive evaluation of steel structure/component.
9. Microwave-IR : a noninvasive device for iron ore compositional analysis.
10. Development of biphasic calcium phosphate.
11. Paving blocks from flyash, blast furnace slag, steel slag, etc.
12. Recovery of gold from waste mobile phones and scraps of various equipment.

CSIR-CGCRI

1. Ceramic membrane based pre-treatment system for BRWO/SRWO plants
2. Ceramic Bio-medical implants
3. Hard and abrasion resistant coating
4. Special glass nodules for nuclear waste immobilization
5. Development of transparent, hard and protective coatings on CR-39 ophthalmic lenses and related plastics.

Durgapur Steel plant (DSP)

1. Micro alloyed BG Coaching wheels

Some of the above technologies will be beneficial for the society and strategic sector.

Academic institutions cover wide range of research areas mainly for advancement of knowledge. They have large number of publications in reputed journals. Some of their research outputs are ready for commercialization. However, they are not associated with innovation in line with STIPolicy 2013.

During the workshop, the following two technologies have been identified which can be converted to beneficial innovations with suitable industrial participation:

1) Master alloy for modification and grain refining of hypoeutectic Al-Si based foundry alloys and its process for manufacture
2) Monel alloy resistant to stress corrosion crack in hydrofluoric acid

It may be mentioned that information on R&D achievements of different laboratories was seldom readily available.

Information for categories (b) and (c) has been given in page 32 of this report. They are omitted here for the sake of brevity.

The collected information has been compiled and the parameters related to innovation have been graded qualitatively for comparison. The study shows that technologies developed in CSIR laboratories are mainly related to processing of materials. Development of new materials took place in limited cases. The academic institutions are mainly involved in knowledge generation and publication. Although they claim that many technologies are available for commercialization, the culture of patenting is limited. Most of the developed technologies are aimed at benefits to the society but very few get commercialized. Cost involved in materials or technology development in the respective laboratories, extents of market penetration of the new materials/technologies and economic or social benefits could not be examined in the absence of pertinent data.

It has also been observed that industry linkage which is essential for successful deployment of innovations in the R&D laboratories has been generally less than expected. The survey among different organisations indicates that Bio and Nano materials are common areas of research. However, from their research outcomes, benefits are yet to be received by the society. It was strange to notice that majority of the organisations and persons are not aware of STI Policy 2013. The culture and the necessity of innovations need to spread among the organisations involved in research and development activities.