

# SCIENCE RESEARCH WITH HIGH-BRILLIANCE SYNCHROTRON LIGHT SOURCE

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*Synchrotron-science has changed dramatically since the development of high brilliance electron accelerator-based light sources in 1990s. In the last twenty years or so, several such facilities have come up, particularly in developed countries, as material characterizations in relevant atmosphere and protein crystallography with tiny-crystals have strong implications in industrial competitiveness. Moreover several new techniques have been developed recently over the entire spectral range of emitted light, from infra-red to high energy x-rays, which have altered our basic understanding of various materials like biomaterials, nanomaterials, soft-matter and semiconductor quantum structures. In addition, rapid development of various x-ray imaging techniques for non-destructive evaluation of compositional/structural homogeneity of engineering materials with nanometer resolution will have tremendous impact in manufacturing industries. As India becomes a developed country, it must have access to such an advanced synchrotron facility in the country that enables knowledge generation in the ever-expanding fields of design-characterization-production of advanced materials and modern medicines. Development of such state-of-the art facility will also enable us to carry out frontier-basic-research in our own country and help us to retain and bring back Indian talents to India. Here we shall discuss briefly the characteristics of a high-brilliance synchrotron source and outline the nature of basic and applied science research that can be done with such a state-of-the-art facility.*

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