

Cryogenic Technology and its Societal Implications

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Abstract—Cryogenics is the science and technology that deals with temperature below 120K. It involves generation, maintenance and studies of materials at very low temperatures. Cryogenic technology has rapidly grown over time and has created a new wave for its remarkable contribution in various industries, basic science, space science, nuclear energy, medicines, life science, agriculture and so on. Cryogenics became a buzz word in India during 1980 when Russia refused to supply cryogenic engines to ISRO for its space programme. The technology involves the use of rocket propellant at extremely low temperatures. Cryogenics is playing an important role in the field of animal husbandry and cryo-preservation of food and marine products. Cryogenic freezing can result in high freezing rates which influence quality of products and has become an ever growing industry with a large market share. Cryosurgery is a recognised method for controlled cryogenic destruction of benign and malignant tissue. Magnetic resonance imaging (MRI) is a common clinical diagnosis device uses cryogenic magnets for its high resolution. SQUID sensor operating under cryogenic environments is the most sensitive detector used to measure the physiological activities of the human heart and brain. Superconducting devices with zero loss operating under cryogenic temperature are extremely useful and economical which finds large application in electrical and transport systems. However there is an utmost need to raise the awareness of its potential applications as well as to develop new ideas. In addition we need to adopt the current technologies which are cost effective and users friendly. This paper presents an overview of cryogenic technology which is useful for its diverse applications.