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High- T_c superconducting applications in society: Super-magnets

We are facing the problem of possible future running out of oil parallel with increase of energy consumption in connection with the expected population growth to 8-10 billion people to the year of 2050. At the moment, we are emitting twice the amount of CO_2 that atmosphere can integrate. For solving this issue, alternate energy sources are solar, wind, but also high- T_c superconductivity at hand. For instance, the electricity generation by Photovoltaics (PV) is needed to highly expand over the present scale of Gigawatts. In connection with this goal, development of energy storage and transportation technologies will be necessary. Together with solving the energy production and transport issues, development of new materials and innovative technologies saving energy consumption is crucial. In this talk, recent trends in high- T_c superconducting material processing will be introduced and then the new super-magnet applications will be presented. The bulk superconducting magnets can trap magnetic fields by order of magnitude higher than the best classical hard magnets and are therefore promising as permanent magnets for use in Magnetic Drug Delivery System (MDDS), for construction of small mobile diagnostic devices, for water cleaning technologies, etc. Human's body is so complicated that a controlled drug delivery is extremely difficult. This process can be accomplished by magnetic force in the body by exerting a strong magnetic field on the diseased tissue. As a result, a high drug concentration can be delivered in a controlled way to the targeted diseased organ. Superconducting material is also used in superconducting DC cables, promising in particular in transport of solar energy as well as in feeding cables for railway system applications. In this presentation, I will summarize the recent development in use of bulk superconducting materials in superconducting magnets and of superconducting cables in various industrial applications.

Biography

Muralidhar Miryala is the Deputy President at Shibaura Institute of Technology (SIT) and Professor at the Graduate School of Science and Engineering. His main task is to transform SIT into a high rank university. He is interested in applications and technology of bulk single-grain superconductors. He is the author and co-author of more than 400 publications and delivered over 100 oral presentations including plenary and invited ones. He holds several Japanese and international patents, received numerous awards, including Young Scientist Award, Director's Award, PASREG Award of Excellence, Best Presentation Award and Amity Global Academic Excellence Award. He is also an Editor-in-Chief and Editorial Board Member of several international journals.

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