UNIVERSITÀ DEGLI STUDI DI TORINO

Dipartimento di Fisica

Seminar Announcement

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Assessment of MgB_2 for different applications

Monday, 08 October 2018, h. 17.00

Sala Wataghin, Physics Department, via P. Giuria 1, Torino

The speaker

Badica Petre, is a Senior Researcher at National Institute for Materials Physics, Magurele, Romania. He graduated MSc in 1992 from University Politehnica Bucharest and was awarded a PhD from National Technical University of Ukraine, 'Kiev Polytechnical Institute' in 1996. He is a former JSPS-STA (AIST, Japan), NIMS (NIMS, Japan), NEDO (IMR, Tohoku University, Japan), MANA (NIMS), Alexander von Humboldt (Mainz University) fellow and a Visiting Prof. of Nanyang Technological University, Singapore and Tohoku University, Japan.

Summary

MgB_2 is usually prized as a valuable practical superconductor. It is a light weight material (2.63 g/cm3), available, non toxic, and it is relatively cheap being free of rare earth or noble metals. MgB_2 has a simple layered haxagonal crystal structure where layers of boron alternate with those of Mg. The coherence length of MgB_2 is about 10 fold larger than for technical high temperature cuprate superconductors (HTS), i.e. it is about 10-20 nm. This enables use of nano precipitates and grain boundaries as effective pinning centers. It also allows the use of this material as a randomly oriented poly crystalline material. Considering that for HTS it is required to have 3D epitaxial structures, this situation is favorable for cheaper and less sophisticated processing technologies of MgB_2 than of HTS. Our work explores the influence of different additives on the critical current density of high density MgB_2 processed by Spark Plasma Sintering. Pinning force parameters are extracted and analyzed. Machinable MgB_2 will be introduced and evaluation of its properties for magnetic shields or magnetic storage applications will be presented. Few aspects of compressive quasi static and dynamic mechanical properties of MgB_2 will be addressed. MgB_2 is also a biodegradable and an antibacterial material. This opens new avenues for application of MgB_2 in the biomedical field and these novel ideas are explored within M-ERA NET project BIOMB/2017. The project is a collaboration between Romania (National Institute of Materials Physics, University of Bucharest and University Politehnica of Bucharest) and Italy (Torino University).

Ref. Marco Truccato