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A Trapped Magnetic Field Over 5 T in Doped Bulk MgB₂

Obtained by *ex-situ* Spark Plasma Sintering

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The advantage of the very low density of MgB₂ bulk samples must be taken into consideration and, the generation of strong magnetic flux densities using MgB₂ should be investigated. It was shown in [1] that the organometallic addition to MgB₂ of Ge₂C₆H₁₀O₇ greatly enhances the pinning forces, leading to higher critical current density J_c and irreversibility field H_{irr} in the added sample compared to pristine MgB₂, Fig. 1(a). All the samples were produced by *ex-situ* Spark Plasma Sintering. In this contribution, we have studied the trapped magnetic field in samples of 20 mm in diameter and 4 mm high, but also in a stack of 6 of these samples leading to a total height of 24 mm. Field Cooling experiments were carried out at temperatures from 12 K to 30 K. The trapped magnetic field inside the stack of 6 samples and at the center of the surface are reported, Fig. 1(b).

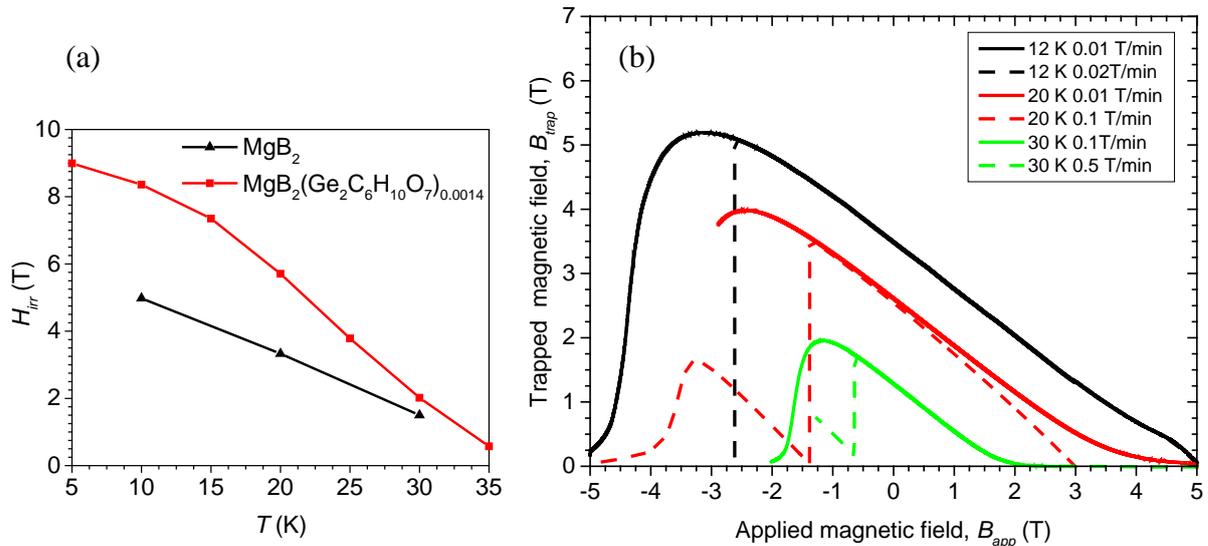


Fig. 1: Irreversibility field H_{irr} of a pristine MgB₂ and of a doped MgB₂ (a), and the measured trapped magnetic field at the center of the surface of a stack of 6 samples of 20 mm diameter & 4 mm high (b).

According to the obtained values of trapped magnetic field greater than 5 T at 12 K, and 4 T at 20 K, to their very low density and to their ease of manufacturing, doped bulk MgB₂ with Ge₂C₆H₁₀O₇ are really interesting for the intended applications.

References

1. D. Batalu, G. Aldica, S. Popa, L. Miu, M. Enculescu, R. F. Negrea, I. Pasuk, and P. Badica, *High magnetic field enhancement of the critical current density by Ge, GeO₂ and Ge₂C₆H₁₀O₇ additions to MgB₂*, Scripta Mater. **82** 61 (2014).