

Observation of Unstable Flux Penetration in HPCVD Deposited MgB₂ Films and Coated-Conductors

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It is believed that MgB₂ films fabricated by using HPCVD do not show magnetic vortex avalanche [1]. In contrast to previous reports, we observed the vortex avalanche behavior for MgB₂ films grown on both metallic tapes and insulating substrates by using HPCVD. At low temperature, $T \leq 10$ K and for field, $H < 1000$ Oe, magnetic flux noise was observed for MgB₂ films and coated-conductors which reduces the low-field value of J_c . Magneto-optical imaging investigation revealed that there are no well-defined dendritic instabilities in these HPCVD films like frequently observes in PLD MgB₂ films, but there are other instabilities that appear at rapid change of magnetic field or temperature, which result in jumps of magnetic moment. The magnetic stability of MgB₂ coated-conductor is very crucial to realize its full potential in various applications like power transmission cables, magnets, and motors etc. Therefore, to overcome the vortex avalanche problem the possible solutions will be discussed.

Keywords: MgB₂ films, metallic tapes, HPCVD

[1] Jae-Yeap Lee et al., "A comparative study of the dendritic avalanche in MgB₂ thin films synthesized by pulsed laser deposition and hybrid physical chemical vapor deposition methods", *J. Appl. Phys.*, 105, 083904, 2009.

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