Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Kinetic roughening of magnetic flux penetration in MgB_2 thin films ANDREA LUCARELLI, GUNTER LUEPKE, College of William and Mary, BRIAN MOECKLY, Superconductor Technologies, Inc., YUE ZHAO, SHI DOU, University of Wollongong — Mg_{B2}thin films exhibit pronounced instabilities such as finger-like structures, flux jumps or dendritic patterns, which endanger electronic devices and lead to energy dissipation. We investigated the magnetic flux behavior of Mg_{B2} thin films samples grown by in situ pulsed laser deposition and in situ reactive deposition technique on different substrates. We performed time-resolved magneto-optical imaging (TRMOI) measurements as a function of applied static field and for a static filed plus ac current to visualize the kinetic roughening of the flux penetration front. The TRMOI images are analyzed by employing dynamic scaling concepts used in the studies of interface roughening of stochastic systems. For both static field and ac current the resulting critical state shows self-affine structure characterized by universal exponents. [1] Dynamic scaling-laws determined in both cases are consistent with the directed percolation depinning model, placing the vortex dynamics of Mg_{B2} in the same universality class as YBCO and Nb.
[1] Lucarelli et al. Appl. Phys. Lett. 91, 22 (2007)

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Date submitted: 30 Nov 2007 Electronic form version 1.4