

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Vortex/Domain Coupling in Superconducting Films on Ferromagnetic Substrates with Different Domain Structures VITALII VLASKO-VLASOV, ULRICH WELP, DANIEL ROSENMANN, WAI KWOK, Argonne National Laboratory, Argonne, IL, ALEXANDER BUZDIN, University of Bordeaux, France, ALEXANDER MELNIKOV, Institute for Physics of Microstructures RAS, Russia, LYUDMILA USPENSKAYA, Institute of Solid State Physics RAS, Russia, VINCENT FRATELLO, Integrated Photonics, Hillsborough, NJ — In this work we address engineering of magnetic pinning in the superconducting/ferromagnetic hybrids. Using direct magneto-optical observations effects of interactions between superconducting vortices in Nb film and magnetization in domains of substituted iron garnet films are studied. Two garnet films with perpendicular anisotropy but different thickness-to-domain width ratios and one showing the reorientation from the in-plane to the normal easy axis are used as substrates. All three samples demonstrate strong domain/vortex coupling and reveal high pinning by domain walls, which persists up to temperatures close to the superconducting T_c . In turn, vortex motion modifies domain structures of garnets at $T < T_c$ resulting in the alignment and strong contraction of wide domains but smaller width changes of narrow domains. A model is proposed explaining the results of our observations. This work was supported by DOE-BES under Contract No. DE-AC02-06CH11357.

Vitalii Vlasko-Vlasov
Argonne National Laboratory, Argonne, IL

Date submitted: 27 Nov 2010

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