INVITED

IN IIA-3

Relationship between Surface Superconductivity, Bulk Superconductivity and the Peak Effect in MgB_2 Single Crystals

Hyun-Sook Lee [a,*], Dong-Jin Jang [a], Byeongwon Kang [b], Hye-Gyong Lee [c], and Sung-Ik Lee [c]

[a] *Department of Physics, Pohang University of Science and Technology, Pohang, Korea*

[b] *Department of Physics, Chungbuk National University, Cheongju, Korea*

[c] *National Creative Research Initiative Center for Superconductivity and Department of Physics, Sogang University, Seoul, Korea*

Utilizing a systematic study of transport measurements, we constructed a detailed *H–T* phase diagram of MgB_2 single crystal. There was no tricritical point of the surface superconductivity, the bulk superconductivity and the peak effect, in contrast to the existence of this point in Nb single crystals, as obtained from the magnetic susceptibility. We found that the surface effect was still strong up to the zero-field superconducting transition temperature and that the peak effect did not disappear on the H_{c2} line because a disordered flux flow was present just below H_{c2}. The disappearance of the peak effect is closely related to thermal fluctuations.

Keywords : MgB_2 single crystal, surface superconductivity, peak effect, vortex dynamics