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Penetration depth study of Li, C and Li+C doped MgB₂ single crystals CATALIN MARTIN, MATTHEW VANNETTE, RUSLAN PROZOROV, Ames Laboratory, Ames, IA 50011, J. KARPINSKI, N. ZHIGADLO, R. KHASANOV, Laboratory for Solid State Physics, ETH, 8093 Zurich, Switzerland — Magnetic penetration depth was studied in single crystals of MgB₂, pure and doped with Li, C and Li+C. At zero applied field London penetration depth is measured and superfluid density, n_s , can be evaluated. We analyze effect of the dopings on n_s , thus on the superconducting gaps. In the vortex state, Campbell penetration depth is measured and it provides information about true critical current unaffected by the magnetic relaxation. In particular, penetration depth in vortex state becomes strongly irreversible, and we show that C doping enhances the irreversibility region, whereas the substitution with Li does not affect it. The results are discussed in terms of two-gap nature of MgB₂.

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