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Interstitial doping induced superconductivity at 15.3 K in Nb₅Ge₃ compound

Journal of Applied Physics 111, 123912 (2012); <https://doi.org/10.1063/1.4730611>A. D. Bortolozzo^{1,2}, C. A. M. dos Santos¹, R. F. Jardim³, C. Ritter⁴, A. Devishvili⁴, M. Rotter⁵, F. G. Gandra⁶, and A. J. S. Machado¹[View Affiliations](#)[View Contributors](#) PDF

ABSTRACT

It is reported superconductivity in Nb₅Ge₃C_{0.3}, an interstitial carbide compound. The temperature dependence of the electrical resistivity, *ac*-susceptibility, and heat capacity (HC) indicate that a bulk type-II superconductivity appears at $T_c = 15.3$ K. Magneto-resistance measurements suggest an upper critical field of $B_{c2} \sim 10.6$ T and a coherence length of $\xi \sim 55$ Å at zero temperature. Neutron diffraction analyzes locate the carbon atoms at the interstitial *2b* site of the Mn₅Si₃ type-structure. Heat capacity data below T_c are well described by BCS theory. The size of the jump at T_c is in good agreement with the superconducting volume fraction observed in susceptibility measurements. A Debye temperature and Sommerfeld constant were also extracted from heat capacity data as 343 K and 34 mJ/mol K², respectively.

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