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Surface Ferromagnetism and Superconducting Properties of Nanocrystalline Niobium Nitride SHIPRA RAI, NITESH KUMAR, A. SUNDARESAN, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore — We report magnetic, transport (electrical) and thermal (heat capacity) properties of nanocrystalline δ -NbN_x prepared by urea-nitridation method and heated at three different temperatures, 700, 800 and 900 °C respectively. Particle size and their agglomeration increases with increasing synthesis temperature. The sample prepared at 900 °C, showed the highest transition temperature, T_c(onset) = 16 K with a transition width (Δ T_c) of 1.8 K, as obtained from resistivity measurement on the cold-pressed bar. Above T_c, magnetization measurements revealed the presence surface ferromagnetism that coexists with superconductivity below T_c. Heat capacity measurements confirm the bulk nature of superconductivity with strong electron-phonon coupling. These results are compared with those of the samples prepared at 800 °C with a lower T_c (10K) and 700 °C, which is non-superconducting down to the lowest temperature measured.

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