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Evolution of the superconducting properties of $CeCoIn_5$ with Yb substitution D. HURT, C. CAPAN, Z. FISK, Department of Physics & Astronomy, UC Irvine, Irvine, CA, USA, A. D. BIANCHI, Dép. de physique, U. de Montréal, Montréal, QC, Canada — We report on the evolution of the physical properties of the Yb substitution series starting from the unconventional superconductor (SC) $CeCoIn_5$ to the isostructural normal metal $YbCoIn_5$. This study was motivated by the recent results of Cd or Hg substitution at the percentage level on the In site in $CeCoIn_5$ which for low concentrations first was shown to lead to the coexistence of antiferromagnetism with SC and to a complete suppression of SC at higher concentrations. At the same time, the lattice constant of $YbCoIn_5$ indicates that Yb enters this compound in a partially divalent configuration suggesting that Yb could also be suitable for doping holes into $CeCoIn_5$. In our substitution series we find that that the unit cell volume stays roughly constant up to an Yb concentration of about 40 %, after which the cell volume begins to decrease gradually to the value of $YbCoIn_5$. At the same time we observe a gradual suppression of the transition temperature T_c to zero at an Yb concentration of 60 %. Interestingly, the shape of H-T-phase diagram remains the same when the axis is scaled with the respective T_c and upper critical field H_{c2}, suggesting that the ratio between Pauli H_p and the orbital critical field H_{c20} remains constant.

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