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Superconducting behavior in the $ZrNi_2Ga_{1-x}In_x$ system ALEX REIGLE, ADAM EGGERT, YULIANG GUO, TYLER JAMISON, SCOTT LEE, KELLY MASON, JESSICA SLATTERY, VINOIN VINCELY, DARREN WONG, TIAGO SCHAEFFER, SAAD ALZAHRANI, JEFFREY BROCK, MAHMUD KHAN, Miami Univ — From both fundamental and applied viewpoints, the phenomenon of superconductivity remains an active research area. Here, we present an experimental study of the intermetallic $ZrNi_2Ga_{1-x}In_x$ ($0 \leq x \leq 0.2$) Heusler alloy system by means of X-ray diffraction, magnetization, and electrical resistivity measurements. At room temperature, the alloys were found to crystallize in the $L2_1$ cubic Heusler structure. The magnetization and electrical resistivity as a function of temperature measurements revealed that all samples exhibit superconductivity at low temperatures despite the fact that the compounds contain ferromagnetic elements. The critical temperature decreases with In concentration, from 2.5 K ($x = 0$) to less than 1.75 K ($x = 0.2$). Additionally, magnetization as a function of applied magnetic field curves collected in the superconducting state exhibit behavior indicative of type-II superconductors. The experimental results and possible explanations as to mechanisms by which In impacts the superconducting properties will be discussed.

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