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SYNTHESIS AND STRUCTURAL, MORPHOLOGICAL AND MAGNETIC CHARACTERIZATION OF THE SUPERCONDUCTING Zr1-xNbxB2

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Since the recent discovery of Akimitsu [1] of superconductivity in MgB_2 at 39 K, MB_2 materials (M = Transition Metal) with the same prototype structure as MgB_2 are considered as candidates for multiband superconductivity. This discovered motivated the investigation to search for superconductivity in similar systems. Binary diborides can crystallize in different structure types, although the great majority are those presenting the AlB2-type structure (P6/mmm space group, number 191) [2]. Although many compounds of MB_2 can crystallize in the AlB_2 type structure, superconductivity in this class of material is relatively rare. For example, the ZrB_2 which crystallizes in the AlB_2 prototype structure, does not presents superconductivity. Recently we showed that small V doping at Zr site in ZrB_2 leads to superconductivity [4]. In this work, we present structural, micro structural, electrical and magnetic studies on $Zr_{1-x}Nb_xB_2$, with $0 \leq x \leq 0.5$.Polycrystalline samples of $Zr_{1-x}Nb_xB_2$ were prepared by arc-melting. The X-ray diffraction patterns were analyzed by Rietveld refinement, allowing the identification of single-phased compounds. The materials were characterized by Scanning Electronic Microscopy (SEM). The SEM micrographs with EDS analysis showed that the presents a uniform composition. Specific heat, magnetization and resistivity measurements confirmed that all prepared samples were superconducting.

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