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Doping studies and superconductivity in Ru-doped Zr_5Ge_3 system XIAOYUAN LIU, SHENG LI, VARUN ANAND, BING LV, University of Texas at Dallas, BING LV TEAM — Searching for new superconducting materials with distinct crystal structures has been proven to be fruitful in achieving higher transition temperature T_c, as seen in cuprates and Fe pnictides. The hexagonal Mn_5Si_3-type structure, with a large amount of compounds crystallizing in this structure and similar structural derivatives, will be an ideal model system to search for new superconductors. Herein, we are reporting firstly a new superconductor $Zr_5Ge_{2.5}Ru_{0.5}$ with T_c ~5.7K from our systematic Ru-doping studies at three selected doping sites for the Zr_5Ge_3 system. Interestingly, with the same Ru-doping, superconductivity is only selectively induced with doping at Ge site, but remains absent down to 1.8K with doping at Zr site or interstitial site. The bulk superconductivity nature for Ru-doped $Zr_5Ge_{2.5}Ru_{0.5}$ sample has been confirmed from magnetic, electrical transport, and heat capacity measurements. The high upper critical field, enhanced electron correlation, extremely small electron-phonon coupling, have indicated possible unconventional superconductivity in this system. Detailed synthesis and characterization will be presented and discussed.

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