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Physical properties of new ternary U compounds $U_3Bi_4M_3$ (M = Rh, Ni) TOMASZ KLIMCZUK, HAN-OH LEE, FILIP RONNING, ERIC BAUER, TOMASZ DURAKIEWICZ, HEATHER VOLZ, JOE THOMPSON, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — A common belief has been that only Sb and Sn can form the $U_3X_4M_3$ structure, but here we show that also Bi can stabilize the structure and two new U ternary compounds $U_3Bi_4Ni_3$ and $U_3Bi_4Rh_3$ can be grown as single crystals out of Bi flux. Both materials form in the same crystal structure as $Ce_3Pt_3Bi_4$, the well known Kondo insulator. Resistivity and photoemission spectroscopy measurements on $U_3Bi_4Ni_3$ indicate the presence of a charge gap, suggesting that it might be a Kondo insulator. However, the nonmagnetic reference compound $Th_3Bi_4Ni_3$ is a semiconductor, and, consequently, $U_3Bi_4Ni_3$ is rather a band insulator, similar to $U_3Sb_4Ni_3$. On the other hand, replacing Ni with Rh, which has one less electron than Ni, to form $U_3Bi_4Rh_3$ produces a metallic resistivity and modestly large electronic specific heat coefficient (γ(0.4K)=200 mJ/mol-U K^2)), characteristic of a Kondo-lattice system. Details of specific heat, magnetic susceptibility and electrical resistivity measurements on these single crystals will be discussed.

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