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**$Ca_{1+\varepsilon}Co_4B_4$ and $Ca_{1+\varepsilon}Ru_4B_4$: New Borides with One-Dimensional Channel Structures** YUKARI KATSURA, HIRAKU OGINO, YUTAKA MATSUMURA, Department of Applied Chemistry, the University of Tokyo , KAZUMASA SUGIYAMA, TOETSU SHISHIDO, Institute for Materials Research, Tohoku University, SHIGERU HORII, JUN-ICHI SHIMOYAMA, KOHJI KISHIO, Department of Applied Chemistry, the University of Tokyo — We discovered two novel borides $Ca_{1+\varepsilon}Co_4B_4$ ($\varepsilon \sim 0.10$) and $Ca_{1+\varepsilon}Ru_4B_4$ ($\varepsilon \sim 0.18$) as the first members of $Gd_{1+\varepsilon}Fe_4B_4$- and $Pr_{1+\varepsilon}Re_4B_4$-type ternary borides with a divalent metal at the rare earth sites. In these compounds, tetrahedral chains of transition metals and boron form tetragonal channel structures, which contain single atomic chains of Ca. These are composite structures of Ca sublattice and CoB/RuB sublattice, with common $a$-axis lengths and independent $c$-axis lengths. The two structural types are distinguished by configurations of the tetrahedral chains. Resistivity and magnetization measurements showed that these compounds are paramagnetic metals down to 2 K. Preliminary first-principle calculations indicated the presence of covalent bonds between transition metals and boron, and electrical conductivity originating from the $d$-bands of the transition metals.

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