Bi$_{3-x}$M$_3$O$_{11-?}$ (M=Cr, Rh, Ir, Pt, Pd): A series of new KSB$_3$O$_3$-type structural magnetic materials

WEI YI, National Institute for Materials Science — KSB$_3$O$_3$-type family is interesting because it can adopt three interpenetrating networks with the composition changing from ABO$_3$ (KSB$_3$O$_3$ and KIrO$_3$) to ABO$_3$.667 (Bi$_3$Ru$_3$O$_{11}$, La$_3$Ru$_3$O$_{11}$, and Bi$_3$GaSb$_2$O$_{11}$). Recently Belik et. al reported a new KSB$_3$O$_3$-type random ferrimagnet Bi$_3$Mn$_3$O$_{11}$ with high T$_c$. Here we reported a series of new KSB$_3$O$_3$-type structural materials Bi$_3$-xM$_3$O$_{11-?}$ (M=Cr, Rh, Ir, Pt, Pd) synthesized by high pressure and high temperature (HPHT). We investigated the effects of oxygen content on the structural, physical, and chemical properties of these materials, because a wide variation of ? value (changed from -0.5 to 0.6) in this system keeps the same cubic structure. In addition, we also studied the effects of Bi content on the structure, physical, and chemical properties. The value of x was changed from 0 to 0.4 in Bi$_3$-xCr$_3$O$_{11-?}$.