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Structural and superconducting properties of $Bi_{1-x}Sb_x$ under high pressure AYAKO OHMURA, Center for Transdisciplinary Research, Niigata University, YASUHIKO FUJIKAWA, AYAKO YAMAMURA, MARI EINAGA, Graduate school of Science and Technology, Niigata University, ATSUKO NAKAYAMA, Center for Transdisciplinary Research, Niigata University, FUMIHIRO ISHIKAWA, YUH YAMADA, Department of Physics, Niigata University, SATOSHI NAKANO, National Institute for Materials Science — We have studied pressure-induced superconductivity and structural phase transition in bismuth-antimony alloy ($Bi_{1-x}Sb_x$), which is a substitutional solid solution over the full composition range. $Bi_{1-x}Sb_x$ crystallizes in the A7-structure with space-group $R\bar{3}m$ at ambient condition and shows pressure-induced structural changes similar to those of pure Bi and Sb: the A7-structure – the incommensurate host-guest composite structure with super space-group $I4'/mcm(00\gamma)$ (the HP-composite phase) – the body-centered cubic one with $Im\bar{3}m$ (bcc). In the composition of $x = 0.08$, these two phase transitions occur above 3 and 10 GPa, respectively. In pure Bi and Sb, the superconductivity is observed in these high-pressure phases. To investigate the superconducting transition in $x = 0.08$, we performed the electrical resistivity measurement at low temperature under high pressure up to 12 GPa using modified Bridgman anvil cell. The superconducting transition is observed above 2.7 GPa with the transition temperature $T_c = 7.0$ K. Furthermore, T_c discontinuously increases up to 8.5 K at 9.7 GPa. As compared to the structural change, the superconductivities observed at 2.7 and 9.7 GPa are attributed to the HP-composite structure and bcc, respectively.

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