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High-pressure synthesis and physical properties of the $BaIrO_3$ polytypes J.-G. CHENG, J.-S. ZHOU, J.B. GOODENOUGH, TMI, University of Texas at Austin, J.A. ALONSO, ICMM, CSIC, Madrid, Spain, E. SUARD, ILL, Grenoble, France, Y. SUI, CCMST, Harbin Institute of Technology, Harbin, China , K. MATSUBAYASHI, Y. UWATOKO, ISSP, University of Tokoyo, Kashiwa, Japan — The ambient 9R-$BaIrO_3$ exhibits a ferromagnetic transition at $T_c \approx 180$ K followed by a charge density wave at nearly the same temperature.[1] By using the 9R phase as the staring material, we were able to synthesize a series of the polytypes of $BaIrO_3$, *i.e.* 5H, 6H and 3C phases under high pressure up to 10 GPa at 1000 $^\circ$ C.[2] These high-pressure phases are quenchable to ambient pressure. The 5H phase has the stacking sequence *hchcc* that is a new member in the hexagonal polytypes of AMO_3 perovskites. With increasing fraction of the corner- to face-sharing $IrO_{6/2}$ octahedra in the sequence 9R→5H→6H, the ground states of $BaIrO_3$ evolve from a ferromagnetic insulator with $T_c \approx 180$ K in the 9R phase to a ferromagnetic metal with $T_c \approx 50$ K in the 5H phase, and finally to an exchange-enhanced paramagnetic metal near a quantum critical point in the 6H phase.[3]

[1]G. Cao, *et al.*, Solid State Comm. **113**, 657 (2000).
[2]J.-G. Cheng, *et al*, J. Am. Chem. Soc. **131**, 7461 (2009).
[3]J.-G. Cheng, *et al.*, Phys. Rev. B **80**, 104430 (2009).

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