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Structural and magnetic properties of high anisotropy $HfCo_{7-x}Fe_x$ alloys[1] BALAMURUGAN BALASUBRAMANIAN, BHASKAR DAS, RALPH SKOMSKI, SHAH VALLOPPILLY, JEFFREY SHIELD, DAVID SELLMYER, Nebraska Center for Materials and Nanoscience, University of Nebraska, Lincoln, NE 68588. — An increasing demand of rare-earth elements in recent years intensifies the search for rare-earth free permanent magnetic materials with magnetocrystalline anisotropy $K_1 = 1$ MJ/m^3. The present study reports melt-spun $HfCo_7$ alloys with a high K_1 of 1.3 MJ/m^3 along with an appreciable saturation-magnetic polarization (J_s) of 8.9 kG. A substitution of Fe for Co in $HfCo_{7-x}Fe_x$ further improves K_1 and J_s to 1.5 MJ/m^3 and 10.4 kG, respectively. XRD studies of $HfCo_7$ are in agreement with an orthorhombic structure and also reveal a lattice expansion on substituting Fe for Co. These results show that $HfCo_{7-x}Fe_x$ can be a promising candidate for permanent-magnet and other significant applications. In brief, the structural and magnetic properties of $HfCo_{7-x}Fe_x$ alloys ($0 \leq x \leq 1$) investigated using XRD, EDX, TEM, and SQUID magnetometer will be presented.

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