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Amorphous Magnetic Films

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Recently, amorphous rare-earth-transition-metal (a-RE-TM) thin films with perpendicular magnetic anisotropy (PMA) are being studied for spin-based nanoelectronics. These amorphous ferromagnetic films exhibit strong PMA, coercivity field of several Tesla and anisotropy energy ~10^6 erg/cm. a-RE-TM is a ferrimagnet containing antiferromagnetically coupled ferromagnetic RE and TM sublattices. The sublattices magnetization compensates each other at the compensation temperature (T_{comp}). Due to the unusual atomic scale structure and wide compositional range of these amorphous films, novel magnetic states can be obtained by appropriately configuring the nanoscale structure. The mechanisms are verified by micromagnetic and atomistic simulations, to be presented in two oral presentations. The ability to control these new properties in amorphous films without the need for epitaxial growth opens a new avenue for enhancing the functionalities of spin-based materials.