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Magnetism and structure of amorphous Co-W alloyed nanoparticles ADRIANA FIGUEROA, JUAN BARTOLOME, ICMA - CSIC, Spain, LUIS M. GARCIA, ICMA - Universidad de Zaragoza, Spain, FERNANDO BARTOLOME, ICMA - CSIC, Spain, CESAR MAGEN, ALFONSO IBARRA, INA - Universidad de Zaragoza, Spain, LUISA RUIZ, JOSE M. GONZALEZ-CALBET, Universidad Complutense, Spain, FREDERIC PETROFF, C. DERANLOT, CNRS - Thales, France, SAKURA PASCARELLI, ESRF, France, PETER BENCOK, Diamond Synchrotron, UK, NICHOLAS B. BROOKES, FABRICE WILHELM, ANDREI ROGALEV, ESRF, France — W-capped Co nanoparticles dispersed in an alumina matrix are studied by means of high-resolution transmission electron microscopy, extended x-ray absorption fine structure, SQUID-based magnetic measurements, ac magnetic susceptibility, and x-ray magnetic circular dichroism. Results show the formation of amorphous Co-W alloy nanoparticles, the magnetic properties of which are modified by the amount of W or Co present in the samples. The average Co magnetic moment depends on the number of W atoms surrounding it. Co-W particles show superparamagnetic behavior and are described as an array of noninteracting particles with random anisotropy axes and an average moment per particle proportional to the particle volume and to the average Co moment for each alloy composition. Values of the magnetic anisotropy constant of the particles are on the order of 10^6 erg/cm^3, higher than that of bulk Co. Evidence of short-range ordering within each amorphous particle is found that provides insight of the origin of their magnetic anisotropy.

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