Superparamagnetic nanoplatforms for theragnostic applications: a structural investigation
IRENA MILOSEVIC, LAURENCE MOTTE, CSP-BAT, Université Paris 13, CNRS, Bobigny 93017, France, MARIE-LOUISE SABOUNGI, IMPMC, Université Pierre et Marie Curie, 75005 Paris, France and Université d’Orléans, Orleans, France, BACHIR AOUN, TAO LI, CHENGJUN SUN, YANG REN, Advanced Photon Source, Argonne National Laboratory, IL 60439, USA — Magnetic nanoplatforms are being developed for use in bioassays, diagnosis, therapy and nano-organocatalysis. The nanoparticle has two essential roles: to act as a probe owing to its specific magnetic properties and to carry on its surface antitumoral molecules, precursor groups for the covalent coupling of biological recognition molecules, or small organic catalysts such as amino acids and alkaloids. The nanoplatforms consist of a superparamagnetic iron oxide core and different coatings for surface passivation and stabilization. We report recent results obtained at the Advanced Photon Source on three kinds of nanoplatforms, differing in their coating molecules: shape and size determination by small-angle X-ray scattering, distribution of valences and chemical environments of the iron ions deduced from X-ray absorption near-edge structure measurements, and atomic structures determined by x-ray diffraction.