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In-situ Light Scattering Measurements of FeOOH spindles in solution PHILIP DEE, Cleveland State University, OLGA DEMENT'EVA, VICTOR RUDOY, Frumkin Institute of Physical Chemistry and Electrochemistry, KIRIL STRELETZKY, Cleveland State University — Characterizing spindle-shaped (nanorice) particles of iron (III) oxyhydroxide (FeOOH) with the Depolarized Dynamic Light Scattering (DDLS) and other light scattering techniques provides an accurate and reliable estimate for nanoparticle size, shape, and dynamics in a native colloidal solution. Specific applications such as targeted synthesis of core/metal nanoshell structures for techniques such as laser photothermal therapy suggest that there's advantage to in situ measurements of FeOOH nanoparticles. FeOOH can also serve as a standard/control system for light scattering characterization of hard-to-image soft-matter particles of certain anisotropic geometries. The analytical geometrical models of prolate spheroid and short cylinder were employed to analyze rotational and translational light scattering data yielding nanoparticle structure and dynamics. The methods which utilized a straight cylinder model created by de la Torre, proved to be most consistent with size distributions obtained by Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). Three independently synthesized FeOOH colloidal solutions with particle size aspect ratios of 3.5-4.6 produced the apparent size estimates that fall within 1 standard deviation of TEM and SEM results.

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