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Magnetically Modulated Optical Nanoprobes: Live Cells and Bioassay Diagnostics BRANDON H. MCNAUGHTON, JEFFREY N. ANKER, RAOUL KOPELMAN, University of Michigan, Applied Physics Program; University of Michigan, Chemistry, CALEB J. BEHREND TEAM, KAREN KEHBEIN TEAM, XIAOJING WANG TEAM — Fluorescent techniques are frequently used for chemical analysis in biological samples because fluorescent dyes produce strong signals that can be easily read with conventional photodetectors, spectrometers, and cameras. Magnetic techniques are used for chemical analysis and measurements of physical viscosity/elasticity because strong magnetic forces and torques are easily applied to magnetic particles without shielding or interference from biological samples. Combining fluorescence detection with magnetic manipulation of metal hemisphere coated "Magnetically Modulated Optical Nanoprobes" (MagMOONs) provides the best features of both techniques. We describe fabrication of uniform magnetic half-coated particles and MagMOON applications for immunoassays, intracellular chemical sensing, and passive or active viscosity measurements on a single particle and ensemble level that is based, in part, on a newly discovered effect: critical slipping of rotationally driven nanoparticles.

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