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Optical Method for Measuring the Curie Temperature of Magnetic Nanoparticles. JOSHUA RAMAGLIA, CORNELIU RABLAU, RONALD TACKETT, MEGAN ALLYN, Kettering University — Ferrofluids - colloidal suspensions of magnetic nanoparticles in a carrier liquid – have been investigated extensively over the past decade for their potential application in targeted cancer therapy through magnetic field induced hyperthermia (overheating) of tumor cells. The vast majority of these studies have been performed using aqueous suspensions of biocompatible surfacted superparamagnetic iron oxide nanoparticles (SPIONs). For better temperature control, it is desirable to use ferrofluids involving ferromagnetic nanoparticles that have a Curie temperature in the 40 degrees Celsius to 60 degrees Celsius range. This allows the ferrofluid to have a built in switch that prevents it from overheating once the target temperature around 45 degrees Celsius is achieved. Such ferrofluids for self-regulated hyperthermia based on $La_{1-x}Sr_xMnO_3$ (LSMO) nanoparticles are currently investigated in the Materials Science lab at Kettering University. In the process, there is a need for a quick – if not most accurate – preliminary method of determining the Curie temperature of the synthesized nanoparticles. In this work we report on the development of a visual semi-quantitative method for determining the Curie temperature based on temperature-induced changes in the light scattering patterns produced by ferrofluids in static magnetic fields.

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