

MAGNETIC BIOFERROFLUIDS WITH TAILORED PROPERTIES FOR BIOMEDICAL APPLICATIONS

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Biocompatible ferrofluids are stable suspensions of superparamagnetic nanoparticles that can be used as part of a delivery system for anticancer agents in loco-regional tumor therapy, called “magnetic drug targeting”. Through this form of drug application, attempts are made to concentrate a pharmacological agent at its site of action that can be visualised by MRI, and to minimize unwanted side effects in the organism. Magnetic nanoparticles can be also made resonantly respond to a time-varying magnetic field, which results in local generation of heat. Then the particle acts as the “active ingredient” capable of increase locally the temperature of not desired biological entities such as tumors working as hyperthermia agents.^[1]

In these materials, a good control of particle geometry and size dispersion is required for a fine tuning of their magnetic properties, i.e. heating power decreases exponentially with increasing nanoparticle polydispersity.^[2]

Several preparative methods are reviewed including the preparation of polymer nanocomposites where isolated maghemite nanoparticles with variable size, narrow size distribution and different shapes are synthesized within a polymer matrix.^[3] The preparation of ferrofluids suitable for biomedical applications is also described. Magnetic and hyperthermic properties of these magnetic nanocomposites and bioferrofluids are discussed.

1. A. Jordan et al., JMMM , **201**, 413, (1999)
2. Rosensweig et al., JMMM, **252**, (2002), 370
3. Millán et al. *Acta Mater.* **55**, 2201-9 (2007).