Phase Separated $Cu@Fe_3O_4$ Heteroparticles from Organometallic Reactants - Potent Agents to Track and Kill Caki-1 Cancer Cells

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$Cu@Fe_3O_4$ heteroparticles with distinct morphologies were synthesized from organometallic reactants. The formation of these nanoparticles is unexpected, because (i) Cu is not a noble metal and (ii) stable binary copper oxides and several ternary Cu-Fe-O compounds such as $CuFe_2O_4$ or $CuFeO_2$ are known. They display magnetic and optical properties that are useful for simultaneous magnetic and optical detection. After functionalization, the $Cu@Fe_3O_4$ heterodimers become highly water soluble allowing their use in biomedical applications. The high toxicity of $Cu@Fe_3O_4$ heteroparticles may lead to a new design of anticancer nanomedicines based on Cu cytotoxicity. A special advantage of these heterodimers lies in the fact that nanodomains of different composition can be addressed separately and specifically and can be used as inorganic drug-delivery agents and simultaneously as strong MRI contrast agents. The probes were characterized by transmission electron microscopy (TEM), high-resolution transmission electron microscopy (HRTEM), superconducting quantum interference device (SQUID), powder X-ray diffraction (XRD), and confocal laser scanning microscopy (CLSM).

References

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Figures

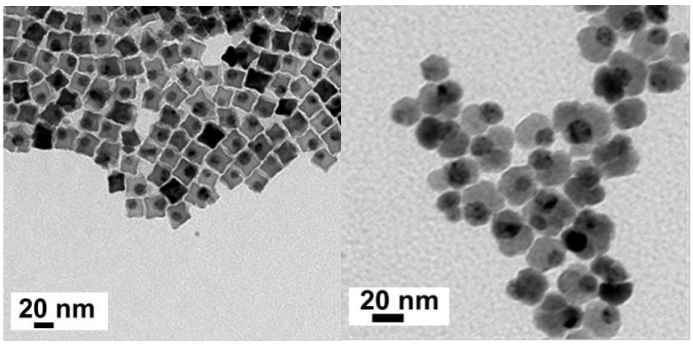

***Figure 1**. Transmission electron microscopy (TEM) images of asymmetric (cubes) and symmetric (cloverleafs) $Cu@Fe_3O_4$ heteroparticles*