

Gold/Cobalt Ferrite Nanocomposite as a Potential Agent for Photothermal Therapy

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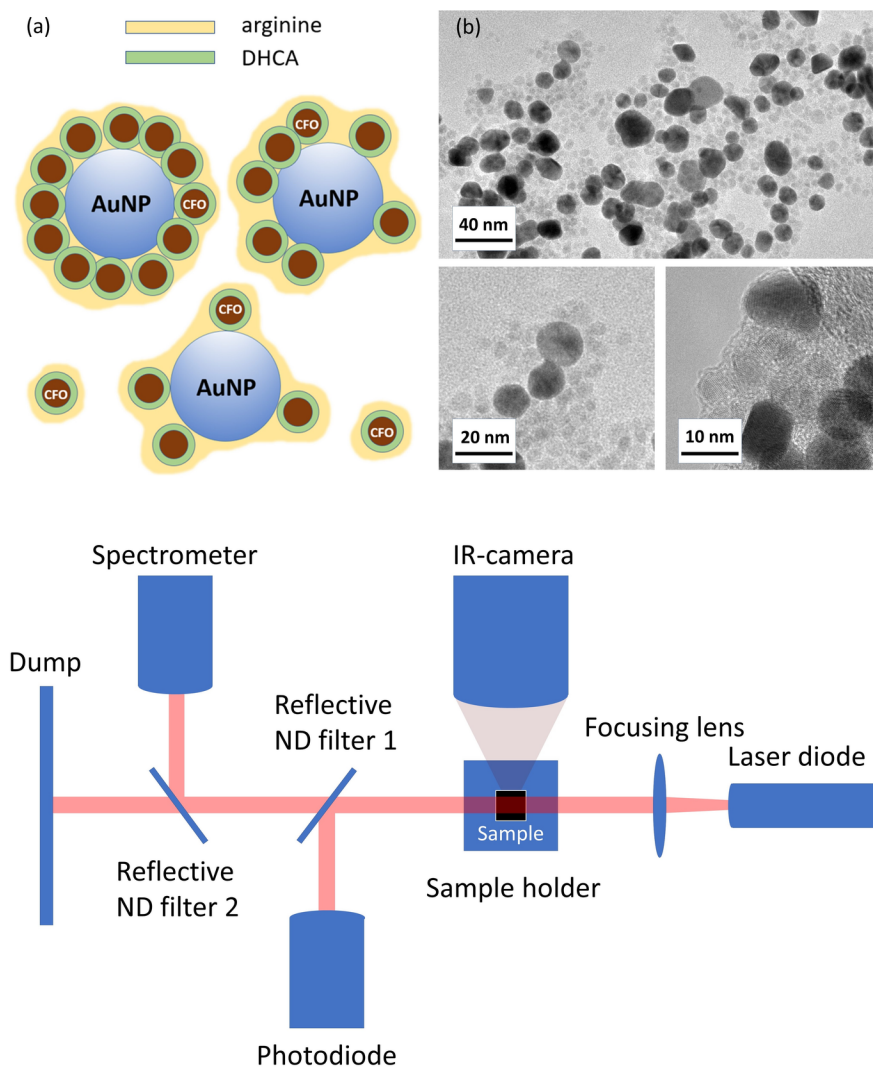
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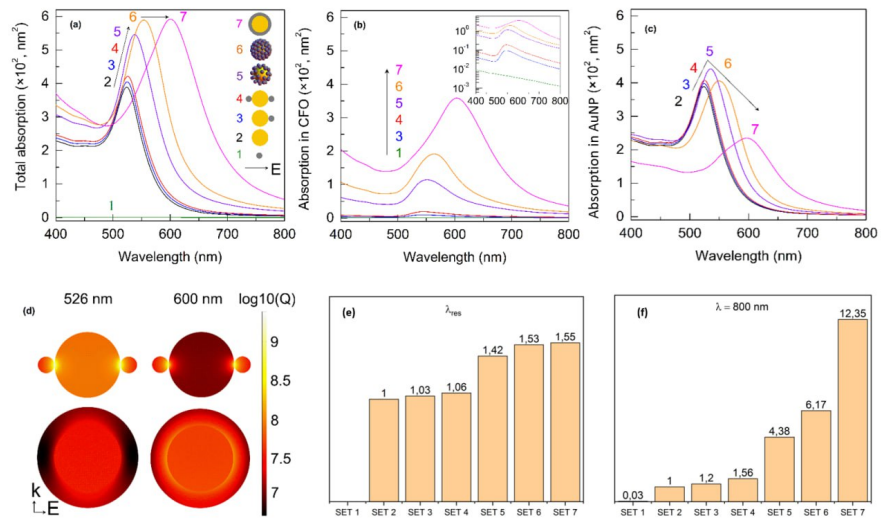
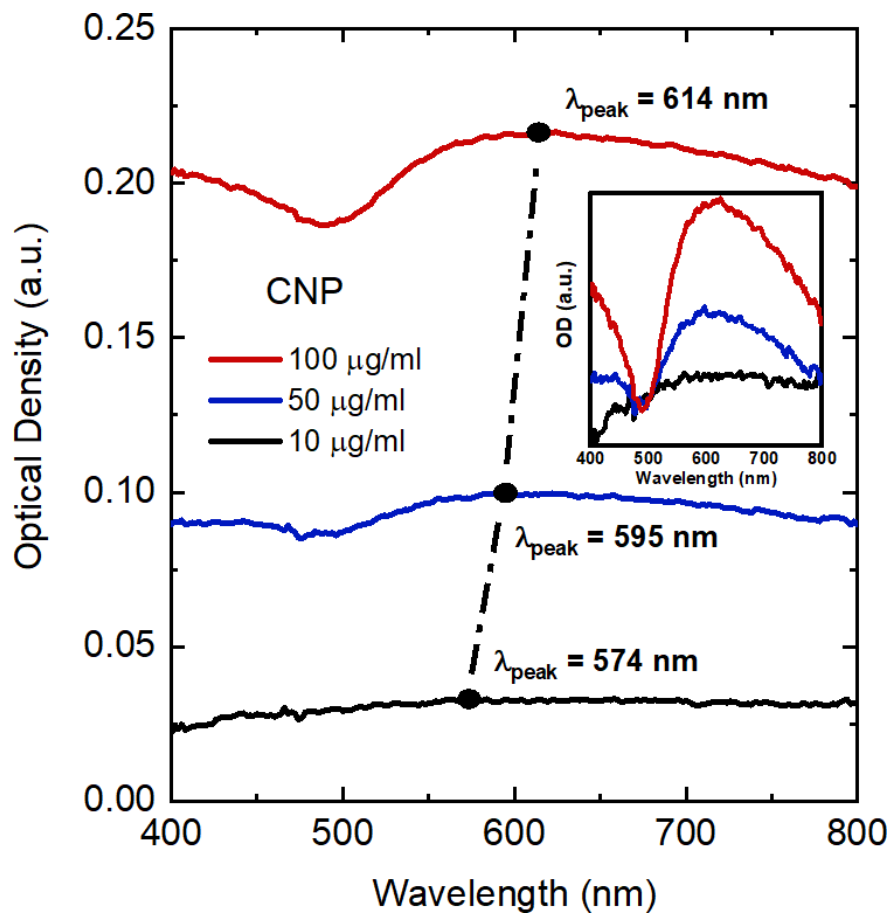
Abstract

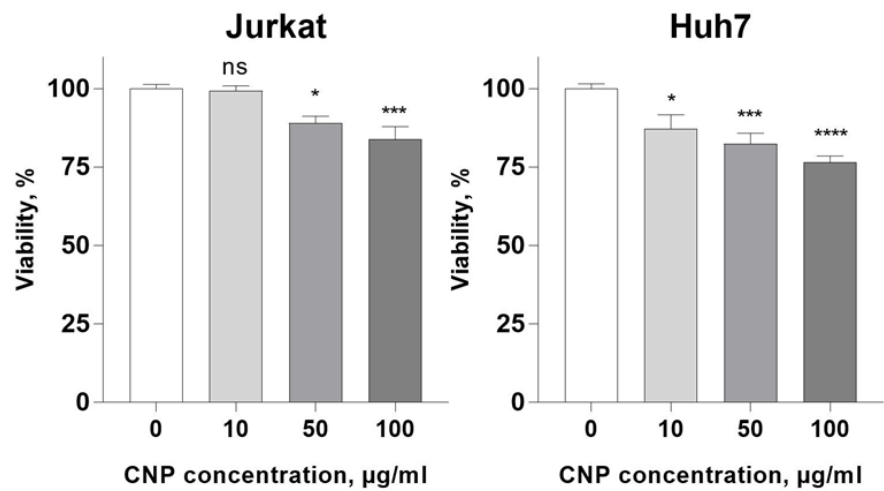
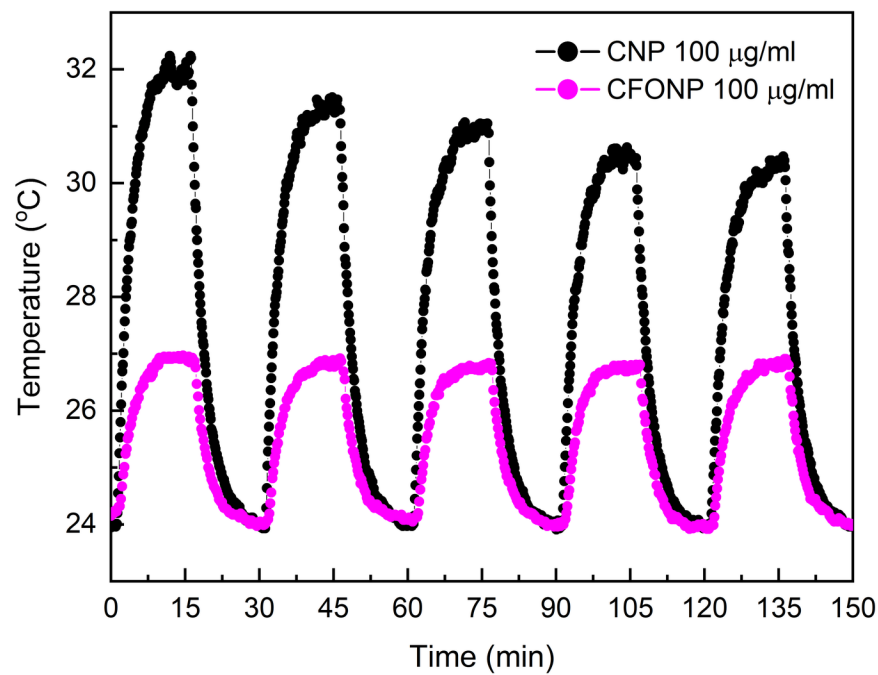
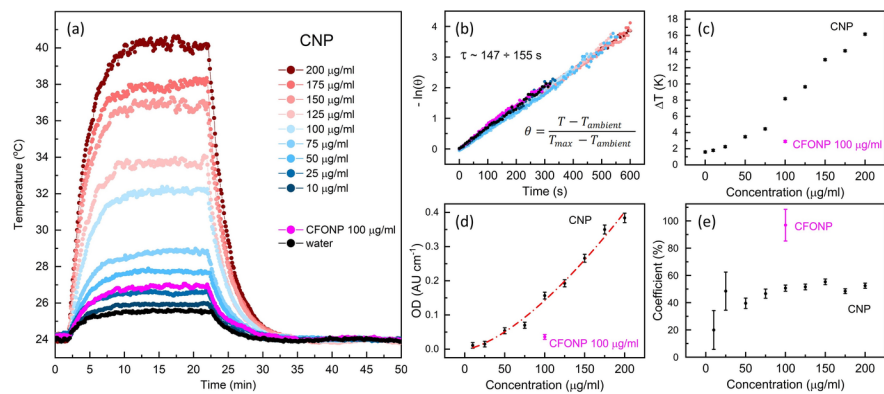
Composite nanoparticles with a gold core enveloped by cobalt ferrite nanoparticles show potential for enhanced photothermal therapy. Determining the optimal gold-to-cobalt ferrite nanoparticle ratio, dependent on size, is vital for improving treatment efficiency. We address the urgent need for advancing photothermal therapy through utilising combined plasmon-magnetic composites with potential of controlled directional delivery. Our computational modeling and experimental absorption spectra analysis reveal that adjusting the cobalt ferrite nanoparticle content redshifts the plasmon resonance frequency in gold nanoparticles, which is accompanied by increase in the extinction cross-section. As a result, cobalt ferrite nanoparticle absorption dominates. Our experiments on photothermal response in aqueous solutions of composite nanoparticles of various concentrations demonstrate that 100 µg/ml solution yields a significant temperature increase of ~8.2 K and a photothermal conversion efficiency of ~51%. At this concentration, the composite nanoparticles effectively heat the cell culture medium under photothermal conditions, leading to 22% reduction in cell viability.

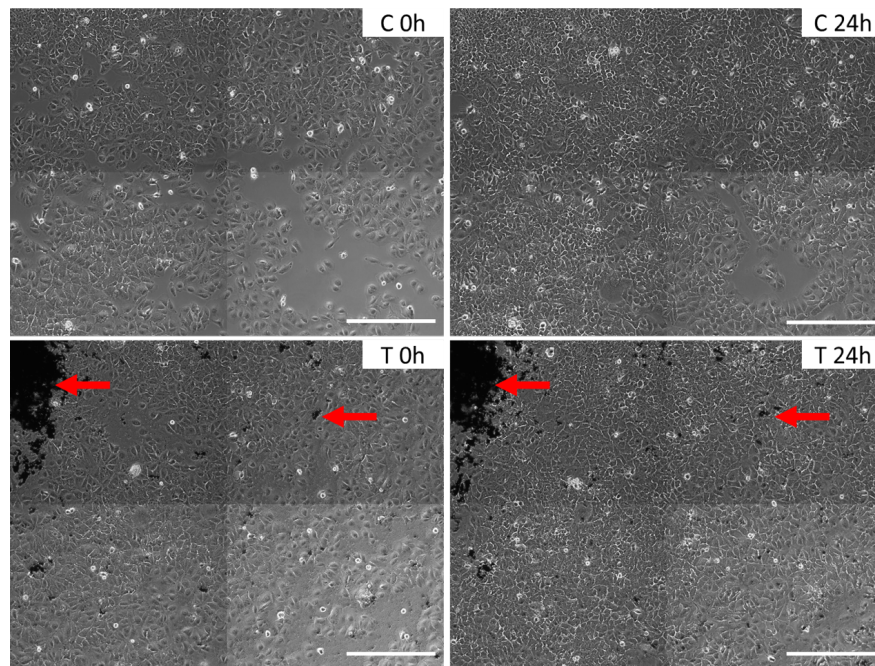
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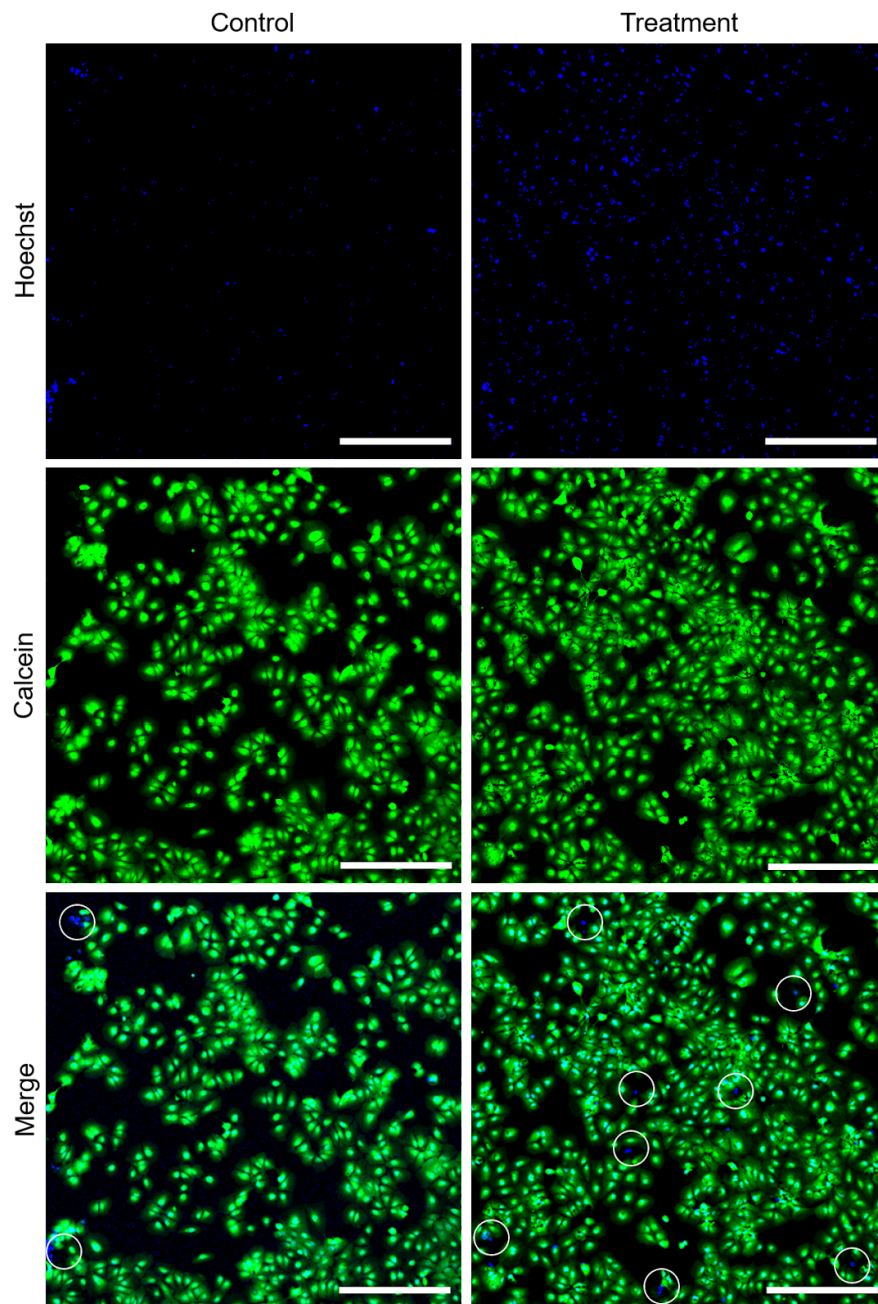
Motorzhina et al manuscript.docx available at <https://authorea.com/users/700029/articles/687084-gold-cobalt-ferrite-nanocomposite-as-a-potential-agent-for-photothermal-therapy>

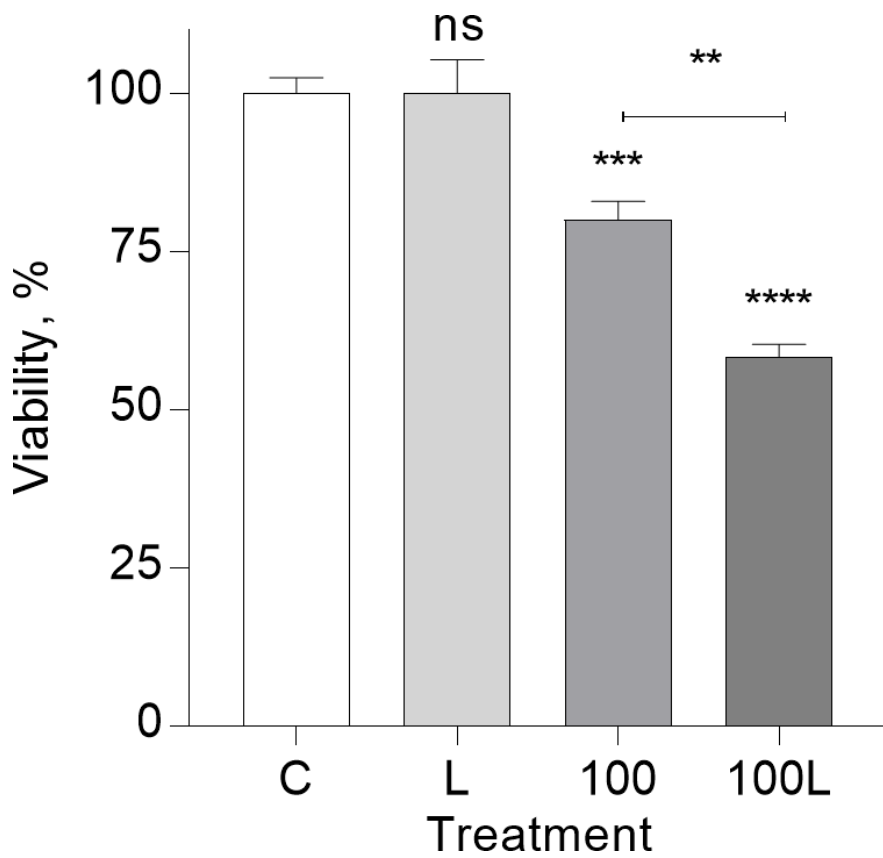
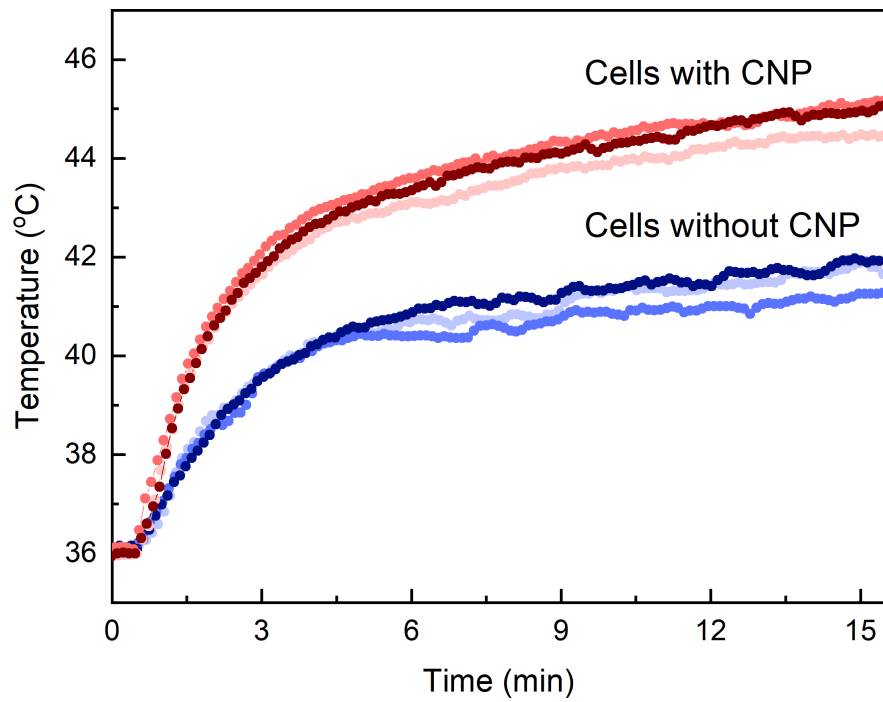


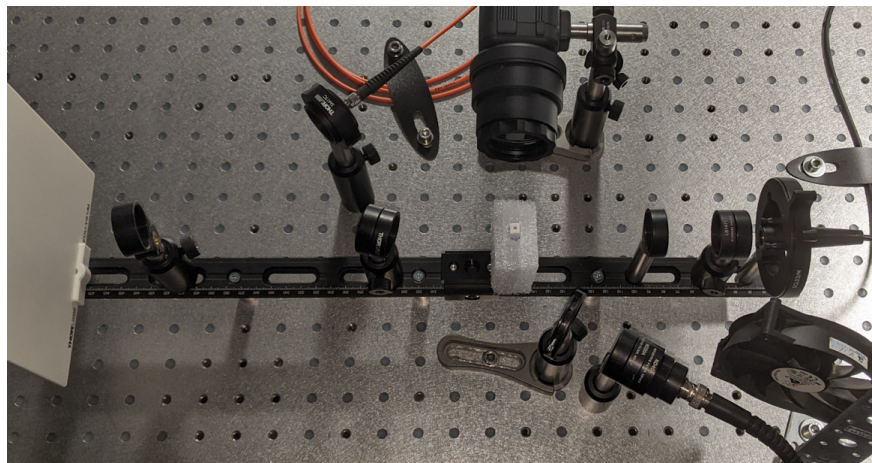












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