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Visible light controlled absorption-desorption on goethite nanowires for drug delivery applications

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Visible light as an external stimulus for smart drug-delivery systems is advantageous for a number of reasons including its non-invasive nature, temporal control, convenience, ease of use and abundance during daily activity.

We found that colloidal system of goethite nanoparticles at specific pH range adsorbs cationic dyes such as methylene blue (MB) rapidly (in less than one minute) and desorbs in long term (5 h) under visible light (Figure 1). We are hypothesizing that visible light irradiation causes heating of goethite nanoparticles, thereby promoting desorption of the MB. Light is absorbed by goethite and photogenerated holes and electrons are recombining but energy is released as a heat thus promoting desorption.

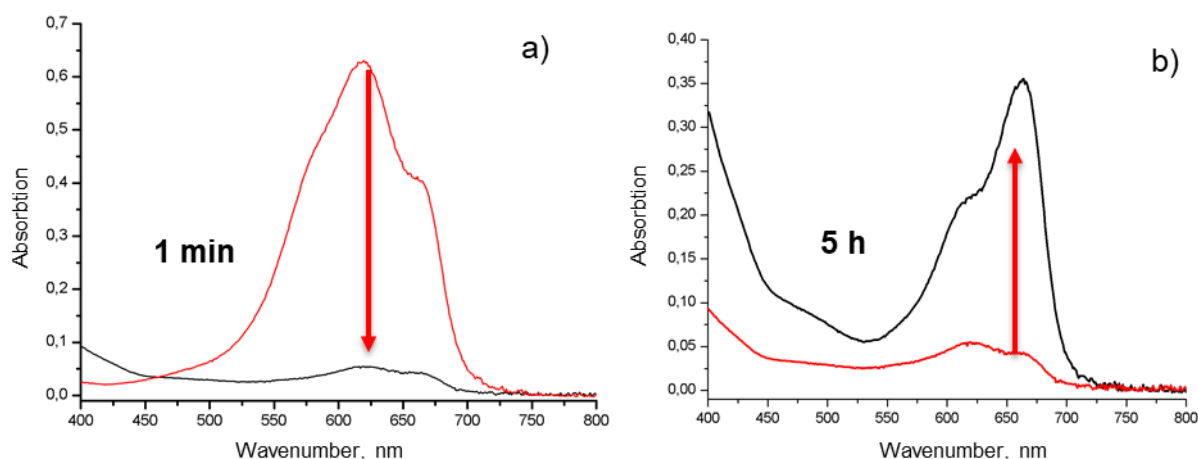


Figure 1. Absorption spectra of MB adsorption (a) and desorption (b) onto goethite nanoparticles

The observed results show a potential for practical application as a visible light driven drug release system, for example, in a natural sunlight, where, depending on the intensity of the sun, drug release is initiated.

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