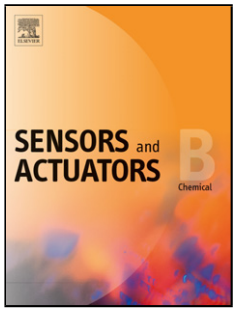

Title: A nanoclay-based magnetic/fluorometric bimodal strategy for ascorbic acid detection

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<AT>A Nanoclay-Based Magnetic/Fluorometric Bimodal Strategy for Ascorbic Acid Detection
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<ABS-Head><ABS-HEAD>Graphical abstract

<ABS-P>► A facile ion-exchange/coordination synthesis strategy for the preparation of MR/fluorescence nanoclay was the first to develop using laponite as a matrix and $Eu(DPA)_3$/$Gd(DPA)_3$ as a bimodal signal source. The fluorescence and MR response of the nanohybrid can be suppressed by AA, exhibiting excellent sensitivity and selectivity with a limit of detection as low as 0.1 μM for fluorescence mode and 0.2 μM for MR mode.
<ABS-HEAD>Highlights► A bimodal sensor was composed of laponite and $Ln(DPA)_3$. ► The sensor was sensitive to ascorbic acid (AA), leading to apparent changes of magnetic resonance (MR) and fluorescence signals. ► The dual-modal sensor for ascorbic acid (AA) detection with a detection limit of 0.1 μM in fluorescence mode and 0.2 μM in MR mode, respectively. ► The cross-validation between MR and fluorescence provided detailed information regarding the AA detection with a synergistic effect of acidity and redox. ► The potential applications of the nanohybrid had been extended to transparent films and MR/fluorescent inks.

<ABS-HEAD>Abstract

<ABS-P>Ascorbic acid (AA) plays an essential role in biochemical processes, as a scavenger for preventing oxidative damage. Although various optical measurement strategies for AA detection have been developed, there is an increasing demand for a multi-modal sensor to obtain detailed information. Herein, we propose a facile ion-exchange/coordination strategy for the preparation of a magnetic resonance (MR)/fluorescence nanohybrid by using laponite (Lap) as a matrix and $Eu(DPA)_3$/$Gd(DPA)_3$ (DPA = Pyridine-2, 6-dicarboxylic acid) as a bimodal signal source. This nanohybrid was observed to have a higher MR response than Gd−DPA, because Gd−DPA was coordinated with Lap to affect proton relaxation parameters, while excellent Eu−DPA fluorescence remained. Moreover, potential applications of the nanohybrid had been extended to transparent films and MR/fluorescent inks. Interestingly, the MR/fluorescence of this nanohybrid was simultaneously suppressed by AA. We found that this decrease was attributed to a synergistic effect of acidity and redox. The MR/fluorescence bimodal detection of $Eu(DPA)_3$/$Gd(DPA)_3$@Lap makes it as a potential biological probe for clinical applications and commercialization because of its simple preparation procedure, excellent MR/fluorescence properties, high sensitivity, and high selectivity.
<KWD>Keywords: Ascorbric acid (AA); magnetic resonance; fluorescence; nanohybrid; detection.