NANOSCIENCE COLLOQUIUM

The Power of Magnetic Nanoparticles within Nanohybrids

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A B S T R A C T : The field of magnetic nanohybrids is rapidly evolving, particularly with recent advances in their design and fabrication. In the first part, I discuss how one can design magnetic particles that fulfil the desired magnetic properties, such as magnetic hardness, and, with this, their suitability for the intended applications. The main synthesis method shown is a green hydrothermal approach. We will discuss the advantages of hydrothermal synthesis and the potential tunability of particle shape, size, and phase.[1-3] In the second part, I will introduce several examples of nanoparticles incorporated into thermoresponsive hydrogels, vitrimers, or even within polymeric cavities.[4,5] As an example, a magnetic vitrimer is shown in Fig. 1, which demonstrates that using the right matrix, the magnetic particles can trigger the self-healing or the actuation of the polymer.[5]

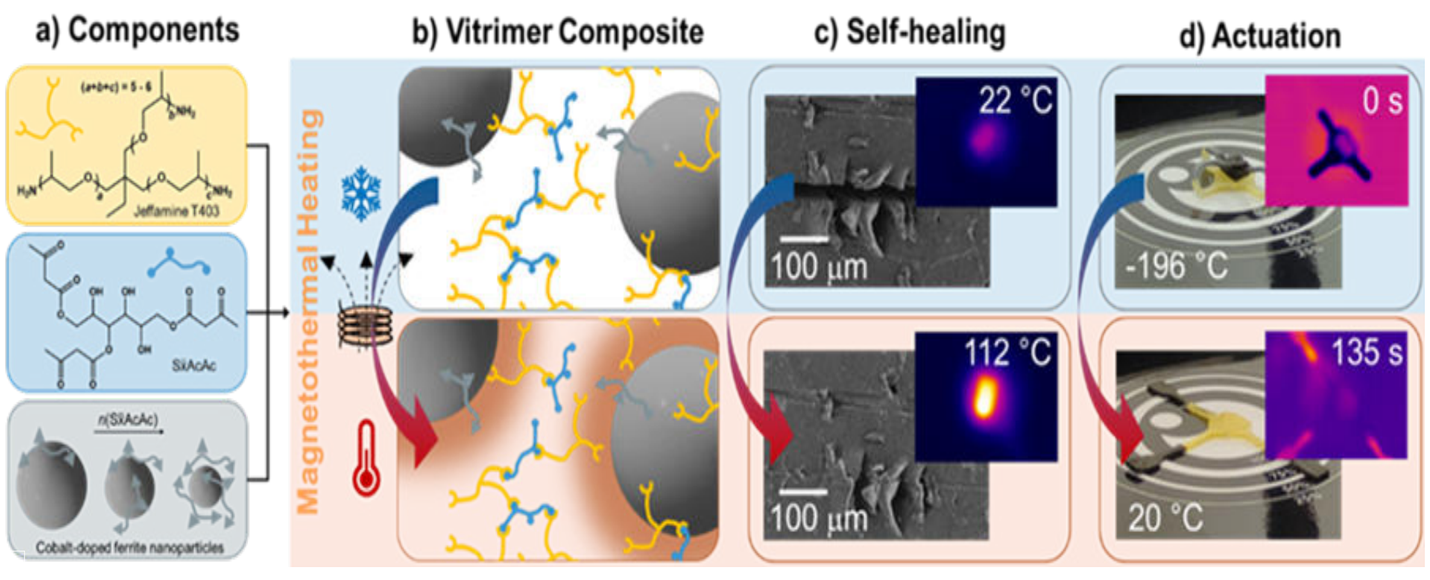

Figure 1: a) Schematic of the single components of the system and b) the resulting magnetic vitrimer nanocomposite, whose dynamic nature can be triggered magnetothermally by inducing a temperature increase above the glass transition temperature using an AMF. Due to this temperature increase of up to 112 °C (36 mT, 142.70 kHz), c) self-healing and d) reshaping properties of the composites are demonstrated. Reshaping is achieved three times faster than without applying an AMF.

References:
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