

Biogenic vs. abiogenic magnetite nanoparticles: A XMCD study

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ABSTRACT

X-ray magnetic circular dichroism (XMCD) experiments were carried out to compare the Fe²⁺/Fe³⁺ ratio in nanomagnetite chemically produced from lepidocrocite and nanomagnetite biogenically produced by the Fe-reducing bacterium *Shewanella putrefaciens*. Together with TEM imaging, these measurements showed that the biotic magnetite nanoparticles were of excellent quality, with small size dispersion and high crystallinity. From the XMCD measurements, it could be shown that the biogenic nanomagnetite contained a higher amount of Fe²⁺ than the abiogenic nanomagnetite.

Keywords: Nanomagnetite, XMCD, *Shewanella putrefaciens*, biomineralization