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# Effect of Heating on Microcrystalline Synthetic Goethite

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**Abstract:** The effect of heating synthetic microcrystalline goethite at 60° , 80° , and 105° C was studied by X-ray powder diffraction, electron microscopy, weight-loss measurements, and Mössbauer spectroscopy. Heating led to no detectable changes in the unit-cell parameters or crystallite size (210, 150, and 170 Å in the [020], [110], and [120] directions, respectively), however, some of the X-ray diffraction lines were broadened due to an increase in microstrain in these crystallographic directions. The superferromagnetic transition temperature increased from 43° to 46° , 53° , and 54° C after heating to 60° , 80° , and 105° C, respectively, showing that the desorption of water from the surfaces led to an enhanced magnetic coupling among the crystallites.

**Key Words:** Crystallite size • Goethite • Microstrain • Mössbauer spectroscopy • Thermal treatment • X-ray powder diffraction

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