

2010

# MICROSTRUCTURAL AND THERMAL PROPERTIES OF NANOCRYSTALLINE FE POWDERS

S. Azzaza, S. Alleg

**Abstract :** The microstructural evolution and thermal properties of nanocrystalline Fe during mechanical milling were investigated by using quantitative X-ray diffraction and thermal analysis techniques. Upon milling of the Fe powders with coarse grains, grain refinement takes place gradually and a steady-state grain size in the nanometer regime (about 13,8 nm) is reached after a certain period of milling. the paramagnetic nanostructured bcc  $\alpha$ -Fe domain is extended by about 50°C at the expense of both the magnetic bcc  $\alpha$ -Fe and nonmagnetic fcc  $\gamma$ -Fe as compared to coarse grained bcc  $\alpha$ -Fe

**Keywords :** Nanomaterials ; Iron; Microstructure; Thermal properties