Magnetic properties of cobalt ferrite-silica nanocomposites prepared by a sol-gel autocombustion technique - DTU Orbit (14/12/2018)

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The magnetic properties of cobalt ferrite-silica nanocomposites with different concentrations (15, 30, and 50 wt %) and sizes (7, 16, and 28 nm) of ferrite particles have been studied by static magnetization measurements and Mossbauer spectroscopy. The results indicate a superparamagnetic behavior of the nanoparticles, with weak interactions slightly increasing with the cobalt ferrite content and with the particle size. From high-field Mossbauer spectra at low temperatures, the cationic distribution and the degree of spin canting have been estimated and both parameters are only slightly dependent on the particle size. The magnetic anisotropy constant increases with decreasing particle size, but in contrast to many other systems, the cobalt ferrite nanoparticles are found to have an anisotropy constant that is smaller than the bulk value. This can be explained by the distribution of the cations. The weak dependence of spin canting degree on particle size indicates that the spin canting is not simply a surface phenomenon but also occurs in the interiors of the particles. (c) 2006 American Institute of Physics.

General information
State: Published
Organisations: Department of Physics, Center for Nanoteknologi, Università degli studi di Cagliari, Istituto di Struttura della Materia
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Pages: 164714
Publication date: 2006
Peer-reviewed: Yes

Publication information
Journal: Journal of Chemical Physics
Volume: 125
Issue number: 16
ISSN (Print): 0021-9606
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.5 SJR 1.252 SNIP 0.926
Web of Science (2017): Impact factor 2.843
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.13 SJR 1.486 SNIP 0.964
Web of Science (2016): Impact factor 2.965
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 1.98 SJR 1.255 SNIP 0.964
Web of Science (2015): Impact factor 2.894
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.54 SJR 1.446 SNIP 1.02
Web of Science (2014): Impact factor 2.952
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.95 SJR 1.559 SNIP 1.174
Web of Science (2013): Impact factor 3.122
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.86 SJR 1.832 SNIP 1.137
Web of Science (2012): Impact factor 3.164
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2