Spatially resolved modelling of inhomogeneous materials with a first order magnetic phase transition - DTU Orbit (16/12/2018)

Spatially resolved modelling of inhomogeneous materials with a first order magnetic phase transition

We present a numerical model that can simulate a magnetocaloric sample on the grain size level, including magnetostatics, heat transfer, local hysteresis and spatial variation of stoichiometry expressed as a variation in Curie temperature. Grain structure of a sample is realised as a number of regions each having a uniform and defined through a Voronoi-map. We show that demagnetising effects, caused by a finite sample size, and spatial variation in can account for the previously experimentally observed 'virgin' effects in the adiabatic temperature change and isothermal entropy change, respectively and first order reversal effect as a function of temperature. We conclude that even a very little variation in local stoichiometry of less than a percent, corresponding to a standard deviation in of for has a significant impact on the overall properties and history dependence of a sample.

General information
State: Published
Organisations: Department of Energy Conversion and Storage, Electrofunctional materials
Contributors: Nielsen, K. K., Bahl, C., Smith, A., Bjørk, R.
Number of pages: 9
Publication date: 2017
Peer-reviewed: Yes

Publication information
Volume: 50
Issue number: 41
Article number: 414002
ISSN (Print): 0022-3727
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.38 SJR 0.717 SNIP 1.011
Web of Science (2017): Impact factor 2.373
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.07 SJR 1.135 SNIP 1.122
Web of Science (2016): Impact factor 2.588
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.1 SJR 0.886 SNIP 1.25
Web of Science (2015): Impact factor 2.772
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.53 SJR 1.096 SNIP 1.408
Web of Science (2014): Impact factor 2.721
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.6 SJR 1.194 SNIP 1.452
Web of Science (2013): Impact factor 2.521
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.31 SJR 1.279 SNIP 1.414
Web of Science (2012): Impact factor 2.528
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.36 SJR 1.266 SNIP 1.399
Web of Science (2011): Impact factor 2.544
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.292 SNIP 1.28
Web of Science (2010): Impact factor 2.109
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.269 SNIP 1.327
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.427 SNIP 1.549
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.38 SNIP 1.612
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.406 SNIP 1.742
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.216 SNIP 1.455
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.133 SNIP 1.438
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.912 SNIP 1.221
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.033 SNIP 1.233
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.925 SNIP 1.212
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.842 SNIP 1.125
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.89 SNIP 1.264
Original language: English
Keywords: First order phase change, Magnetocaloric, Hysteresis, Model
Electronic versions:
paper_current.pdf. Embargo ended: 19/09/2018
DOIs:
10.1088/1361-6463/aa86e2
Source: PublicationPreSubmission
Source-ID: 137166817
Research output: Research - peer-review › Journal article – Annual report year: 2017