# Magnetic phase transition in multiferroic $Sr_{1-x}Ba_xMn_{1-y}Ti_yO_3$ (with $x \geq 0.43$ and $y \geq 0$) system - specific heat studies

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The $Sr_{1-x}Ba_xMn_{1-y}Ti_yO_3$ multiferroics are the subject of intensive research, because in them, the same Mn ions are responsible for both the antiferromagnetic and the ferroelectric ordering. Thus, a strong coupling between electric and magnetic order parameters can be expected. The specific heat studies were performed for a series of ceramic samples differing in Ti and Ba content, over the temperature range 2 – 395 K, in magnetic field up to 5 T. The magnetic contribution was determined by extracting the lattice contribution (estimated by mixing the Debye and Einstein models) from the total specific heat measured and it was analyzed carefully. It was found that for majority of the studied compositions, the anomaly accompanying the magnetic phase transition is symmetric and a small thermal hysteresis of its appearance on heating and on cooling the sample is observed. This evidences the 1st order character of this transition. This effect was interpreted as the result of a strong coupling between the electric and magnetic degrees of freedom (a large change of electric polarization at the magnetic transition was reported in [1]). Specific heat anomalies were approximated by the Lorentz functions and the latent heat related to the magnetic transitions was assessed.

**References:**

[1] Chapagain et al., Phys. Rev. Mater. 3, 084401 (2019).

*This work was supported partially by the National Science Centre, Poland, under project No. 2018/31/B/ST5/03024.*