

# Magnetic and magnetocaloric properties of cobalt substituted $\text{Fe}_7\text{Se}_8$ single crystals

Y. Konopelnyk,<sup>1</sup> I. Radelytskyi,<sup>1</sup> P. Iwanowski,<sup>1</sup> D.J. Gawryluk,<sup>1</sup>  
M. Berkowski,<sup>1</sup> R. Diduszko,<sup>2</sup> J. Fink-Finowicki,<sup>1</sup> and H. Szymczak<sup>1</sup>

<sup>1</sup>*Institute of Physics PAS, Warsaw, Poland*

<sup>2</sup>*Tele and Radio Research Institute, Warsaw, Poland*

The main purpose of this research is to determine magnetocaloric effect (MCE) in iron selenide  $\text{Fe}_7\text{Se}_8$  (3c type) single crystals doped with 2% of cobalt atoms. The single crystals have been grown applying modified Bridgman's method. Magnetization measurements have been carried out using magnetometer SQUID MPMS 7XL. MCE has been determined based on  $M(H,T)$  measurements. The compound is ferrimagnetic metal with high Neel temperature. The 3c type structure derives from the hexagonal (NiAs-type) by introducing ordered Fe vacancies. The first order phase transition of the spin reorientation type from easy c-axis to easy c-plane has been observed near the temperature  $T_r \approx 132$  K. Conventional magnetocaloric effect related to the metamagnetic transitions has been found above  $T_r$  while below  $T_r$  inverse MCE was identified. The magnetization and magnetic anisotropy as a function of temperature have been measured and discussed in relation to the observed rotational magnetocaloric effect.

*This study was partially supported by the National Center for Research and Development, research project no. PBS2/A5/36/2013.*