SEMINARIUM Z MAGNETYZMU I NADPRZEWODNICTWA

Uprzejmie zawiadamiamy, że w **środę**

7 lutego 2024 r., o godz.10:00

odbędzie się seminarium **w sali 203, budynek I**

na którym

mgr Abdul Khaliq

(Instytut Fizyki PAN, Warszawa)

wygłosi referat na temat:

"The influence of incorporating Sn and Mn into GeTe on magnetic interactions and magnetotransport effects"

Narrow gap $IV_{1-y}Mn_yVI$ multiferroics such as $Ge_{1-y}Mn_yTe$ and $Sn_{1-y}Mn_yTe$ offer novel possibilities due to the simultaneous presence of several intriguing phenomena such as coexistence of ferroelectric and ferromagnetic orders, control of spin-texture via ferroelectric polarization, high temperature thermoelectric figures of merit of SnTe/GeTe are important for device applications. Furthermore, the combination of ferromagnetic and ferroelectric orders can lead to Zeeman splitting and Rashba type splitting effects, respectively, in a single system. Semiconductor multiferroics such as $Ge_{1-x-y}Sn_xMn_yTe$ hold potential towards discoveries related to the interplay between electronic states, spin/orbital degrees of freedom, and coupling between ferroelectric and ferromagnetic orders.

In this seminar, structural characterizations followed by magnetic and magnetotransport investigations of $Ge_{1-x-y}Sn_xMn_yTe$ crystals will be presented. In the low concentration limits of $y \leq 0.04$, the crystals behave like paramagnet down to liquid helium temperature. In the Sn-rich regime, $Ge_{1-x-y}Sn_xMn_yTe$ crystals demonstrated large variation in the nature of magnetic ordering. A magnetically disordered state depicting properties close to a canonical spin-glass was observed in the intermediate level of $y \approx 0.05$, cluster-glass state for $0.052 \leq y \leq 0.07$, and ferromagnetic order for higher Mn contents was observed. The spin-dynamics and potential barrier analysis demonstrate that the cluster-glass state constitute small size frozen ferromagnetic-like clusters with spin relaxation time just above the spin-glass limit.

In the second part of the presentation, magnetotransport studies of $Ge_{1-x-y}Sn_xMn_yTe$ crystals are presented in the temperature range, $T \approx 1.6 - 300$ K, as a function of temperature and high magnetic fields up to $|H| = 130$ kOe. The scattering mechanisms responsible for temperature dependence of resistivity, $\rho_{xx}(T)$, are presented. For $Ge_{1-x-y}Sn_xMn_yTe$ crystals, the $\rho_{xx}(T)$ results take contributions from mixed scattering mechanisms such as phonons and polarons. From high field magnetotransport data, the anomalous Hall resistivity is discussed with a modified scaling law to separate the residual and temperature dependent scattering mechanisms. Such analysis allows distinguishing between the parameters resulting from residual and phononic scattering processes related to skew scattering, and quadratic term emanating from side jump/intrinsic mechanism which cannot be obtained using conventional scaling.

Wykład będzie prowadzony w języku angielskim w sali 203,
dostępna będzie również transmisja ZOOM - link podany jest na stronie IF PAN.

Serdecznie zapraszamy

Roman Puźniak / Andrzej Szewczyk / Henryk Szymczak