## Vibrational and AF-instabilities and metal-insulator transition in $Tm_{1-x}Yb_xB_{12}$

**N. Sluchanko**[a], A. Bogach[a], A. Azarevich[a], V. Glushkov[a], M. Anisimov[a], S. Demishev[a], V. Filippov[b], and N. Shitsevalova[b]

[a]A.M.Prokhorov General Physics Institute of RAS, 38, Vavilov str., Moscow 119991, Russia
[b]I. Frantsevich Institute for Problems of Materials Science NAS, 3, Krzhyzhanovsky str., 03680, Kiev, Ukraine

Low temperature charge transport (resistivity, Hall and Seebeck coefficients) and thermodynamic properties (magnetization and heat capacity) have been studied in substitutional solid solutions $Tm_{1-x}Yb_xB_{12}$. It was shown that the depression of antiferromagnetic (AF) state is accompanied with a development of metal-insulator transition (MIT) in the range of Yb content $x$ above the quantum critical point $x_c \sim 0.3$.[1] Moreover, when the MIT occurs, simultaneously with the gap opening ($E_g \sim 200$K) a short radius (~5-9Å) manybody states' formation is observed at intermediate temperatures 50-300 K with effective masses of the heavy fermions $m^* \sim 20 m_0$.[2] The coherent regime of charge carriers' transport is consistent with a conduction via the intra-gap states (manybody resonance) with the bound energy $E_a \sim 55$-75 K. An analysis of thermodynamic properties and Raman spectra transformation in $RB_{12}$ allows to conclude in favor of the development of vibrational instability and cage-glass state formation at $T^* \sim 60$ K.[3]

[1]N.E.Sluchanko et al., JETP Lett. **89**, 256 (2009).
[2]N.E.Sluchanko et al., cond-mat/1103.4517 (2011).
[3]N.E.Sluchanko et al., JETP in print (2011).