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A XAS study of Gd doped 1212 thallium based superconductors

D.A. ZAJĄC¹, W.M. WOCH¹, J. STĘPIEŃ¹, CZ. KAPUSTA¹,
A. KOŁODZIEJCZYK¹, G. GRITZNER²

¹ Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Al. Mickiewicza 30, PL 30-059, Kraków, Poland

² Institute for Chemical Technology of Inorganic Materials, Johannes Kepler University, 4040 Linz, Austria

Results of X-ray absorption spectroscopy experiments on Gd doped $(\text{Tl}_{0.5}\text{Pb}_{0.5})\text{Sr}_2(\text{Ca}_{1-x}\text{Gd}_x)\text{Cu}_2\text{O}_z$ ($x=0.1, 0.2$ and 0.3) compounds are reported. Measurements have been carried out at the synchrotron laboratory HASYLAB/DESY in Hamburg, Germany. The Gd L3 absorption edges were studied in the XANES (near-edge) region and in the EXAFS (extended x-ray absorption) region for the three samples mentioned. The XANES spectra are typical for Gd in oxide compound with the absorption edge followed by a strong ”white line” peak which slightly decreases its intensity with increasing Gd content x . The Fourier transformed EXAFS spectra reveal two well resolved peaks corresponding to the oxygen nearest neighbours and the cation next neighbour shell, respectively. From simulations and fits of the EXAFS spectra to the structure of the host 1212 compound the location site of gadolinium is determined and its possible influence on the local structural environment of the site is analyzed.