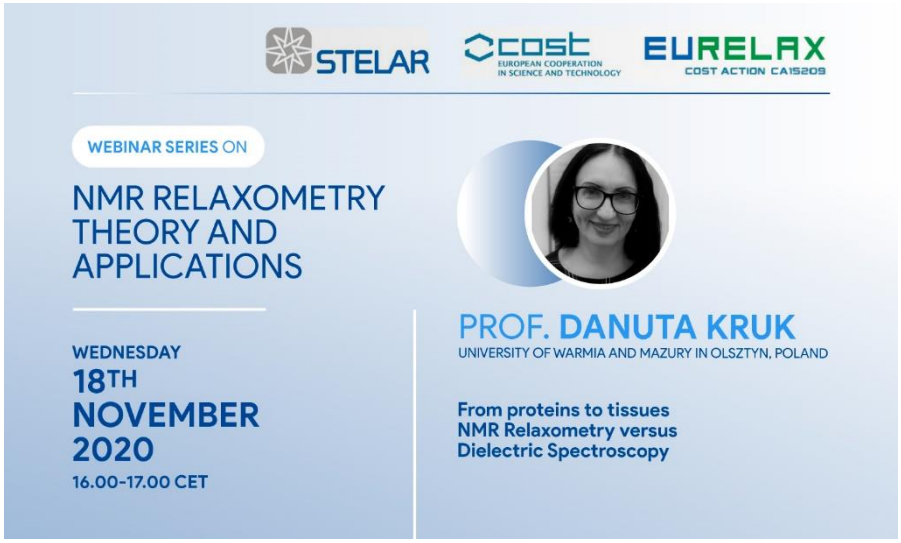

Abstract

From proteins to tissues - NMR Relaxometry versus Dielectric Spectroscopy

D. Kruk

University of Warmia and Mazury in Olsztyn, Poland

Email: danuta.kruk@matman.uwm.edu.pl

One of the key applications of NMR relaxometry is dynamics of biological (biomolecular) systems. The studies range from “simple” systems, such as water solutions of protein to tissues and create a long list of questions: Do we really observe only water dynamics? Can one really unambiguously identify the mechanism of motion leading to the relaxation process? Can one see exchange dynamics? Does indeed the amplitude of quadrupole peaks reflect the fraction of immobilized protons? What is the reason of different shapes of relaxation dispersion profiles for different kinds of tissue? Can the relaxation features observed for tissues be explained by comparisons with some simpler systems? What can one learn from observing different relaxation slopes? Are the slopes a fingerprint of surface diffusion or protein backbones fluctuations? And there is the Rotation Mediated Translation Diffusion model – do we really see this effect? And if so, does I explain low frequency relaxation effects in pathological tissues or is it rather water exchange? And so on… And, what happens if we compare the information obtained from NMR relaxometry with Dielectric Spectroscopy results? To which extent will our concepts win the battle? I will try to answer to some of the questions.

Author Biography

Danuta Kruk – professor of physics at the University of Warmia and Mazury in Olsztyn, Poland. Scientific interest: Theory of spin resonances and relaxation processes; Dynamics of viscous liquids and glass-forming systems; Relaxation process in condensed matter and solid state; Dynamical properties of macromolecular systems (proteins, polymers);Transport phenomena and dynamics of solid and liquid electrolytes; Relaxation processes in paramagnetic and superparamagnetic systems; Novel contrast agents for Magnetic Resonance Imaging; Nuclear Magnetic Resonance relaxometry for medical diagnosis. Author of two books: Kruk D. (2007) Theory of Evolution and Relaxation of Multi-spin Systems. Application to Nuclear Magnetic Resonance (NMR) and Electron Spin Resonance (ESR), Arima, Bury St Edmunds UK; Kruk D. (2015) Understanding Spin Dynamics, Pan Stanford.