



As. prof. I. Kratochvilová, Ph.D.

As. prof. I. Kratochvilová, Ph.D. studied nuclear engineering at Czech Technical University in Prague. At 2006 she obtained professorship at the Faculty of the Nuclear Physics, Czech Technical University, Prague, she is boss of Physical Properties of Biomaterials group and boss of SAFMAT/NanoESCA laboratory Institute of Physics, AS CR. Her team was rated as one of the best in the Institute of Physics AS CR in 2015 academic evaluation. From 1997 she has been teaching at Czech Technical University in Prague - lectures for the MSc/PhD students (Solid State Physics, Molecular Nanosystems), she wrote 2 books for students, supervised 6 master theses and 5 PhD thesis. She was inventor of two Czech and two European patents (EP3139951B1: Polypeptide recombinant vaccines for protection against Lyme borreliosis in human and veterinary medicine, EP3047046: Layer protecting the surface of zirconium alloys used in nuclear reactors).

She obtained experiences with nanosystems containing organic materials during post-doc position at the Penn State University studying charge carrier transport through various types of organic molecules, cooperated with teams from Penn State University, Rice University and Yale University. Her interpretation of charge transfer through organic molecules with a very strong impact.

I Kratochvilová investigated nanodiamond particles containing bioactive complexes and new liposomic composites for application in medicine and pharmacy (biomarkers/drug delivery systems). A novel method for remote monitoring of chemical processes in biological environments based on colour changes from photoluminescence of nitrogen-vacancy centres in nanodiamond. This high-level quality paper represents an important contribution to understanding the nanodiamond luminescence phenomenon and was selected to A Contribution in II Pillar Board by Czech Council for Research, Development and Innovation. Kratochvilova excellent research results (publications, patents) were presented in the media, highly appreciated by the Czech society and part of team was nominated for prestigious award Česká hlava 2014 (Czech Head 2014) and obtained award Cooperation of the Year 2014 for the project "Recombinant Vaccine against Lyme Borreliosis" and Award of the Technological Agency of the Czech Republic (patented and published).

Irena Kratochvilova found a new effective concept of Zr alloy nuclear fuel rod surface protection against degradation caused by both working and accidental temperatures oxidation in nuclear reactor environment. The corrosion of zirconium alloys is reduced by covering the outer surface of the nuclear fuel rod with a protective layer consisting of a polycrystalline diamond (PCD) layer (patented and published). Zirconium fuel elements coated with anti-corrosion protective polycrystalline diamond (PCD) layers were selected by Westinghouse as potential candidates for Accident Tolerant Fuel in commercially operated reactors. Discovery of new way against corrosion protection of nuclear materials nuclear fuel rods by PCD coating was widely presented in the media (newspapers and TV) and highly appreciated by society (Scientists Help Safeguard Nuclear Reactors, Materials Performance, 2015). [www.ceskatelevize.cz/ivysilani/1097181328-udalosti/218411000100607\(linkis_external\)](http://www.ceskatelevize.cz/ivysilani/1097181328-udalosti/218411000100607(linkis_external)), www.ceskatelevize.cz/ivysilani/11633975240-veda-24/218411058340023

Recently, I. Kratochvilová has been studying electrical and structural properties (STM, AFM) of specific biomolecules' (DNA, RNA) New biophysical topic is the research of the relationship between the condition of a living cell (state of DNA/RNA and other markers and selected parameters of their cultivation and cryopreservation protocols with potential applications for in vitro fertilisation This work has been done in cooperation with ISCARE, Faculty of Mathematics and Physics, Charles University in Prague and 1. Faculty of Medicine, Charles University in Prague.