

Supervisor recommendation

Petr Sezemsky became a member of the Laboratory of Applied Plasma Physics and Nanostructures in 2015 as a master student, and after a successful defense, he has followed as PhD student under my supervision. The general topic of his research is the study and development of (bio)active, nanostructured surfaces prepared by means of low-temperature plasma.

Petr has made a great achievement within four and half years of his PhD. His ultimate aim was fundamental study and development of active surfaces for the simultaneous, two-domains interrogating sensor. Petr employed the concept of optical fiber coated by highly tailored ITO (indium doped tin oxide) thin films, that can propagate the lossy mode resonance (LMR) effect for optical interrogation. Furthermore, the surface of coated ITO-LMR optical fiber is naturally electrically conductive and serves as a working electrode for simultaneous electrochemical detection. The LMR phenomena on the optical fiber were firstly and theoretically described in 2010 and Petr belongs among a few pioneers that approved the concept experimentally by advanced ITO nanoarchitecture. Precise ITO tailoring allowed simultaneous optical and electrochemical detection, too. The concept of simultaneous two-domain interrogation was proved by the detection of borreliosis pathogens.

I can confirm that Petr developed a complete procedure for the fabrication of multiple-domain interrogating sensors. Petr (i) developed the system and technology for optical fiber coating, (ii) carried fundamental research of ITO thin films for simultaneous optical and electrochemical interrogation, (iii) developed a unique method for plasma diagnostic that enable in-situ monitoring of the deposition for highly tailored ITO films, (iv) approved a unique concept of the two-domain interrogating sensor by successful detection of the borreliosis pathogens. Petr has tightly collaborated with colleagues from the Institute of Physics CAS, namely achievement (iii) and colleagues from Warsaw Technical University and Gdansk Technical University, respectively, achievement (iv). Petr always played a key role in this national and international collaboration. He was at several scientific missions to universities in Warsaw, Gdansk, and Greifswald; always with a good reputation and results that were published.

Petr is an author or co-author of 18 papers, published after the peer-review process in WoS-index journals, which form the core of his PhD thesis. He is the first author of papers in Plasma Sour. Sci. Technol. (IF 3.9) and Sensors and Actuators B (IF 7.5). It is worth mentioning that there are another three papers where Petr acts as a co-author, but these are out of PhD topic. Furthermore, another paper with fundamental research of ITO structures for simultaneous sensing has been published recently in Nanophotonics (IF 8.5). Petr visited several international conferences and workshops mostly with oral contributions. Practically we can say that there are more than two dozens of contributions (papers, conference proceedings) that Petr has successfully disseminated.

Finally, I can say that Petr carried experimental research on a high level. He is the enthusiastic fellow who works hard with a high level of responsibility and independence. I appreciate his endurance and complex attitude when facing hard scientific challenges. It was my pleasure to collaborate with him and to see his professional growth and personal development. Namely, in the last year(s) of his PhD my role was rather as an "observer" and discussing partner than the supervisor. In my opinion, Petr acted personally as well as scientifically far beyond standards expected for PhD students. It is my pleasure to recommend his thesis for the defense without any doubts.

doc. RNDr. Vítězslav Straňák, Ph.D.

supervisor of Petr Sezemsky

in České Budějovice, December 23rd, 2021