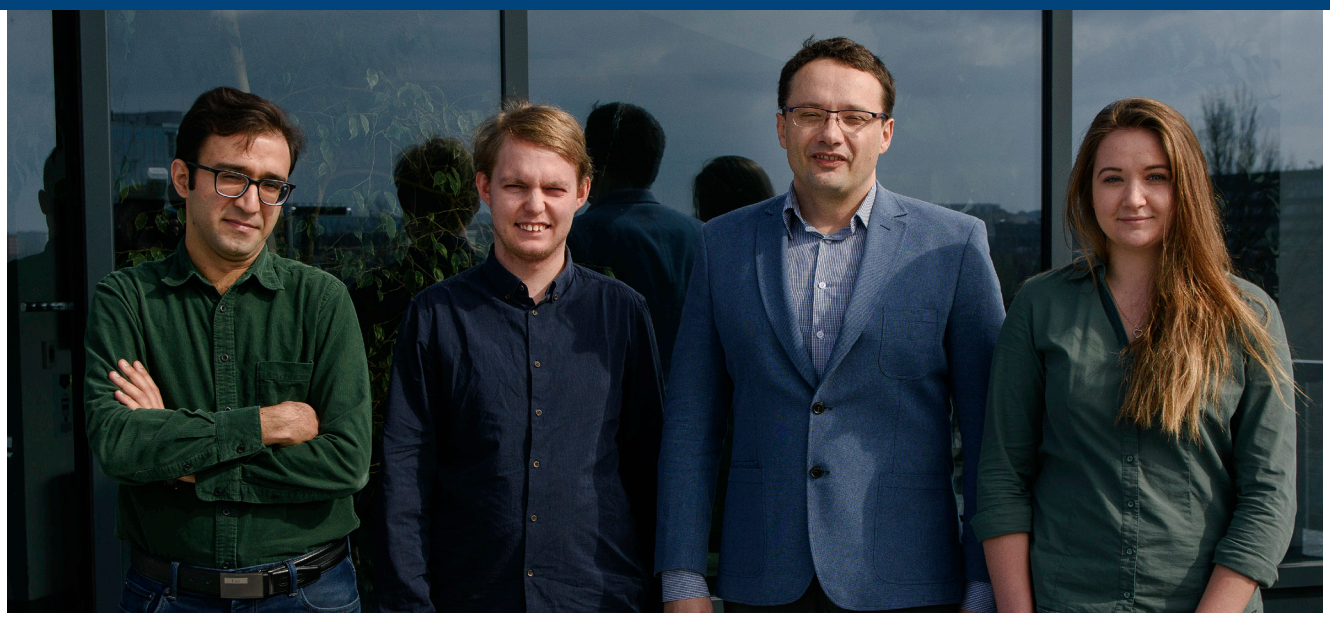
Physico-chemistry of Materials („Szosz-lab")



HEAD:

Robert Szoszkiewicz*, PhD DSc

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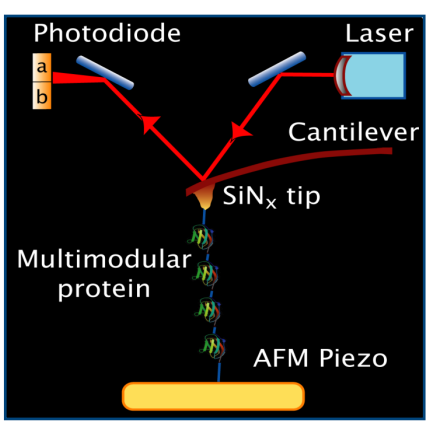
RESEARCH PROFILE:

Our current research focuses on physico-chemical properties of various engineering surfaces and single-molecule biophysics of proteins and peptides.

• We measure nano-mechanical properties of nano- and micro-objects such as single proteins, as well as



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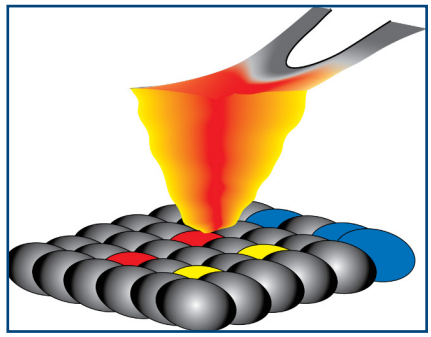
- We modify the physico-chemical surface properties of 2D materials such as MoS_2 using heat and the thermochemical nanolithography (TCNL) method.



For our research we use modern methods of studying materials at local scales, including atomic force microscopy, selected lithography methods, methods of electron microscopy (SEM, TEM), methods of chemical composition analysis, such as X-ray photoelectron spectroscopy (XPS) and energy-dispersive X- ray spectroscopy (EDS), local Raman spectroscopy, and other methods.

SELECTED PUBLICATIONS:

1. U. Ukegbu, R. Szoszkiewicz, Microscopic kinetics of heat-induced oxidative etching of thick MoS2 crystals, Journal of Physical Chemistry C. 123 (2019) 22123-22129.
2. W.L. Spychalski, M. Pisarek, R. Szoszkiewicz, Microscale insight into oxidation of single MoS_2 crystals in air, Journal of Physical Chemistry C. 121 (2017) 26027-26033.
3. A. Avila-Flores, L.R.M.M. Aps, N. Ploscariu, P. Sukthankar, R. Guo, K.E. Wilkinson, P. Games, R. Szoszkiewicz, R.P.S. Alves, M.O. Diniz, Y. Fang, L.C.S. Ferreira, J.M. Tomich, Gene Delivery and Immunomodulatory Effects of Plasmid DNA Associated with Branched Amphiphilic Peptide Capsules, Journal of Controlled Release. 241 (2016) 15-24.
4. D. Ljubić, M. Srinivasan, R. Szoszkiewicz, I. Javni, Z.S. Petrović, Surface modified graphene/single-phase polyurethane elastomers with improved thermo-mechanical and dielectric properties, European Polymer Journal. 70 (2015) 55-65.
5. N. Ploscariu, K. Kuczera, K.E. Malek, M. Wawrzyniuk, A. Dey, R. Szoszkiewicz, Single Molecule Studies of Force-Induced S_2 Site Exposure in the Mammalian Notch Negative Regulatory Domain, Journal of Physical Chemistry B. 118(18) (2014) 4761-4770.
6. R. Szoszkiewicz, E. Riedo, Sliding charges, Nature Materials (News and Views). 13 (2014) 666-668.
7. E. Gnecco, E. Riedo, W.P. King, S.R. Marder, R. Szoszkiewicz, Linear ripples and traveling circular ripples produced on polymers by thermal AFM probes, Physical Review B. 79 (2009) 235421.
8. S. Garcia-Manyes, J. Liang, R. Szoszkiewicz, T.-L. Kuo, J.M. Fernandez, Force activated reactivity switch in a bimolecular chemical reaction, Nature Chemistry. 1 (2009) 236. Mentioned on the Cover page.
9. T.-D. Li, J. Gao, R. Szoszkiewicz, U. Landman, E. Riedo, Structured and viscous water in sub-nanometer gaps, Physical Review B. 75 (2007) 115415.
10. R. Szoszkiewicz, T. Okada, S.C. Jones, T.-D. Li, W.P. King, S.R. Marder, E. Riedo, High-speed, thermochemical nanolithography with sub-15 nm feature size, Nano Letters. 7(4) (2007) 1064.