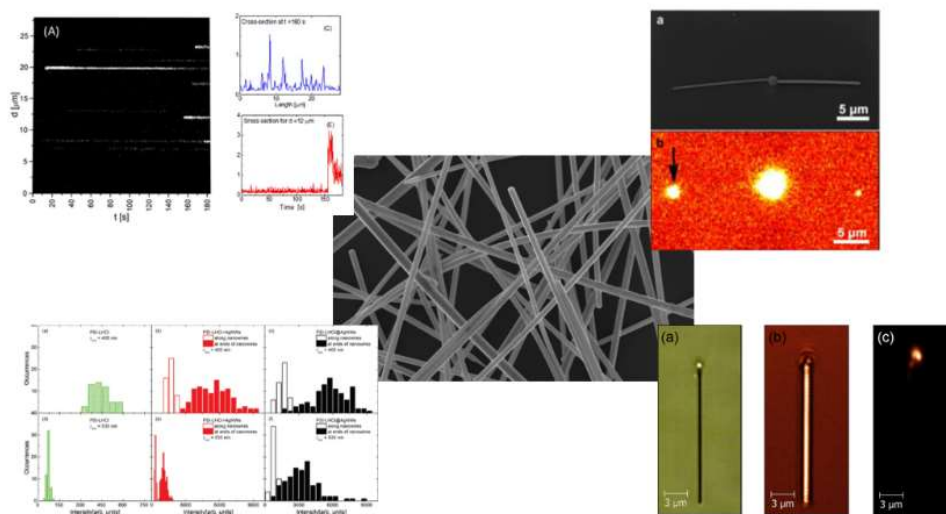


Silver nanowire – plasmonic magic wand

Sebastian Mackowski

Nanophotonics Group, Institute of Physics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University, Torun, email: mackowski@fizyka.umk.pl

The presentation will focus on advocating for uniqueness of silver nanowires, metallic structures with diameters of 100 nm and lengths up to a millimeter [1]. While the diameter of the nanowires is small enough to facilitate localized surface plasmon resonance, their length is sufficiently large to exploit propagation of energy over considerable distances. In combination with advanced nanostructural manipulation, these properties open virtually unlimited playground for interdisciplinary research, which spans over fluorescence enhancement [2-4], remote and high efficiency sensing [5-7], long-range energy propagation [8-10], controlled photocatalysis, heat propagation, etc.



As all of the experiments involve some form of fluorescence microscopy and spectroscopy, surface functionalization, microdroplet deposition, and alike, essentials of the technical aspects will be discussed to the necessary detail.

Experimental demonstrations will include:

1. Plasmonic enhancement of protein fluorescence
2. Real-time single protein detection
3. Remote activation of luminescence
4. Interfacing nanowires with quantum dots
5. Remote photocatalysis

Research was partially financed by the National Science Centre (Poland) within the grants 2013/10/E/ST3/00034, 2013/09/D/ST3/03746, 2016/21/B/ST3/02276, 2016/22/E/ST5/00531, 2017/27/B/ST3/02457, and 2017/26/E/ST3/00209, and 2018/31/G/ST3/03596, as well as by the National Centre for Research and Development within the DZP/POLTUR-1/50/2016.

References:

- [1] J. Niedziółka-Jönsson, S. Maćkowski, *Materials* **12**, 1418 (2019)
- [2] M. Olejnik, et al. *Applied Physics Letters* **102**, 083703 (2013)
- [3] M. Szalkowski, et al. *Nanoscale* **9**, 10475 (2017)
- [4] M. Ćwik, et al. *Opt. Express* **29**, 8834 (2021)
- [5] M. Szalkowski, et al. *Sensors* **18**, 290 (2018)
- [6] K. Sulowska, et al. *Methods Appl. Fluoresc.* **8**, 045004 (2020)
- [7] J. Grzelak, et al. *Sens. Actuator B-Chem.* **273**, 689 (2018)
- [8] A. Prymaczek, et al. *Nanoscale* **10**, 12841 (2018)
- [9] D. Buczyńska, et al. *J. Phys. Chem. C* **124**, 15418 (2020)
- [10] A. Prymaczek, et al. *Sci. Rep.* **11**, 3557 (2021)