

# BioNanoLab



## HEAD:

Maciej Mazur\*, PhD DSc

## GROUP MEMBERS:

PhD students: Paulina Głowała, Marta Bartel, Barbara Wysocka, Ilona Mojzych, Marta Kwiatkowska, Jarosław Wojciechowski

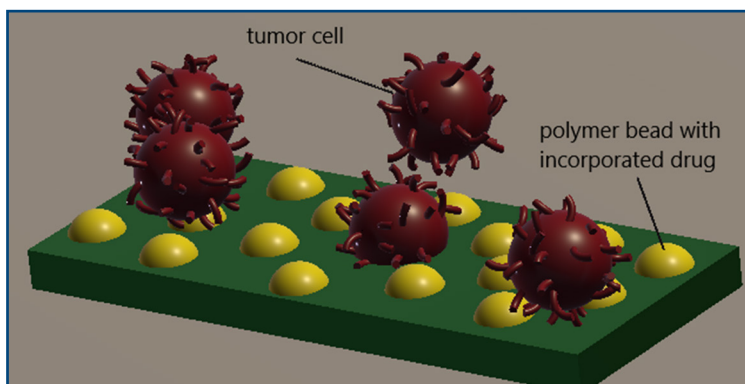
## RESEARCH PROFILE:

Synthesis and physicochemical characterization of bionanomaterials, drug nanocarriers and contrast agents for medical imaging, hybrid organic-inorganic particles, biomineralization phenomena in invertebrates, new methods for the diagnosis of kidney diseases.

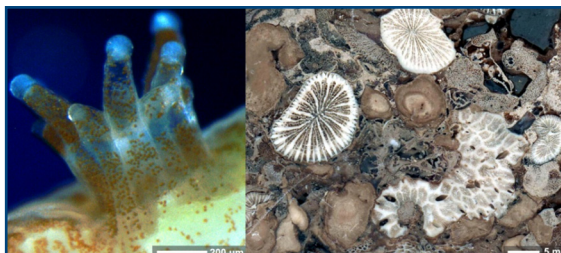
## CURRENT RESEARCH ACTIVITIES:

The research interests of the group focus on several main topics.

The first one is synthesis of nanoparticulate species prepared from organic (polymers) and inorganic (metals, non-metals, oxides, hydroxides) materials. These structures are next investigated with a range of



physicochemical techniques including microscopy (SEM, TEM, AFM, optical microscopy, Raman mapping), spectroscopy (vibrational spectroscopy, absorption and emission in UV-VIS range, XPS, TOF-SIMS), electrochemistry, etc. The focus is on medical applications where the particles act as drug carriers or contrast agents in 3D imaging methods (CT, MRI, SPECT and PET).



The second research path is being developed in cooperation with the PAS Institute of Paleobiology and is devoted to investigations of biomineralization and diagenetic processes in invertebrates like corals, sponges, arthropods, etc. These studies are conducted using spectroscopic (Raman) and microscopic techniques (SEM, TEM, AFM).



The third area of research is the development of new analytical tools for the diagnosis of kidney diseases, e.g. nephrotic syndrome. These studies are conducted in cooperation with the Warsaw Medical University.

## SELECTED PUBLICATIONS:

1. J. Stolarski, F.R. Bosellini, C.C. Wallace, A.M. Gothmann, M. Mazur, I. Domart-Coulon, E. Gutner-Hoch, R.D. Neuser, O. Levy, A. Shemesh, A. Meibom, A unique coral biomineralization pattern has resisted 40 million years of major ocean chemistry change. *Scientific Reports*. 6 (2016).
2. K. Frankowiak, X.T. Wang, D.M. Sigman, A.M. Gothmann, M.V. Kitahara, M. Mazur, A. Meibom, J. Stolarski, Photosymbiosis and the expansion of shallow-water corals. *Science Advances*. 2 (2016).
3. K. Kijewska, A. Jarzębińska, J. Kowalska, J. Jemielity, D. Kępińska, J. Szczytko, M. Pisarek, K. Wiktorska, J. Stolarski, P. Krysiński, A. Twardowski, M. Mazur, Magnetic-Nanoparticle-Decorated Polypyrrole Microvessels: Toward Encapsulation of mRNA Cap Analogues, *Biomacromolecules*. 14 (2013) 1867-1876.
4. K. Kijewska, G.J. Blanchard, J. Szlachetko, J. Stolarski, A. Kisiel, A. Michalska, K. Maksymiuk, M. Pisarek, P. Majewski, P. Krysiński, M. Mazur, Photopolymerized polypyrrole microvessels. *Chemistry: A European Journal*. 18 (2012) 310-320.
5. J. Stolarski, A. Meibom, R. Przeniosło, M. Mazur, A Cretaceous scleractinian coral with a calcitic skeleton, *Science*. 318 (2007) 92-94.