Materials for Biosensors

HEAD:

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GROUP MEMBERS:

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RESEARCH PROFILE:

Optical and electrocatalytic applications of graphene oxide and metallic nanostructures, nanostructures of conducting polymers as support for enzymes, controlled orientation of enzymes, PM-IRRAS and Raman studies of surfaces, infrared and Raman mapping of samples

CURRENT RESEARCH ACTIVITIES:

Currently we investigate applications of graphene oxide combined with metallic nanoparticles as possible fluorescence quenchers and enhancers of Raman and infrared spectra. We study also intrinsic electrocatalytic properties of reduced graphene oxide, composites with metallic nanoparticles and enzymes immobilized on such composites. Our interest includes also conducting polymers – in particular hydrogels composed of conducting polymers as supports for enzymes and/or other catalysts. Another research activity are studies of microplastics by infrared and Raman microscopy.

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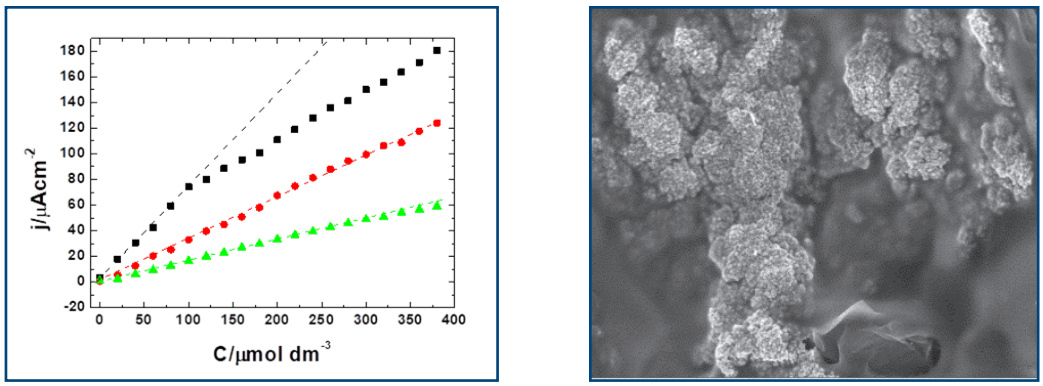

Fig. 1 Electrocatalytic reduction of H_2O_2 on electrochemically reduced graphene oxide on gold nanoparticles

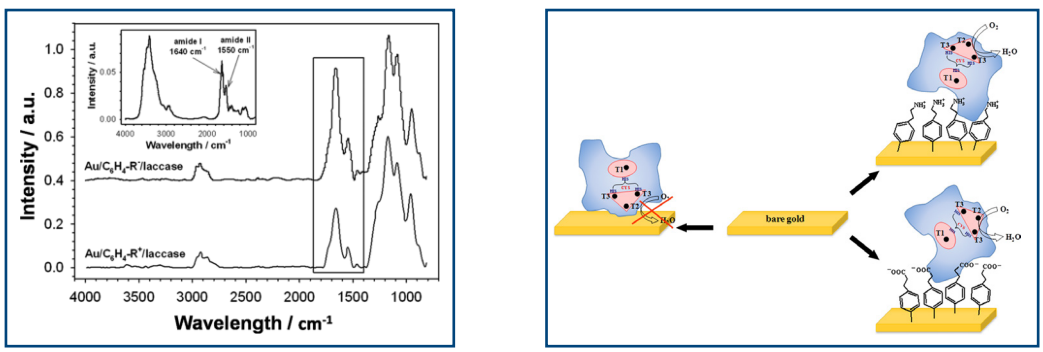

Fig. 2 PM-IRRAS spectra of laccase on variously charged surfaces[5] (reprinted with permission of ACS)

SELECTED PUBLICATIONS:

1. S. Berbeć, S. Żołądek, A. Jabłońska, B. Pałys, Electrochemically reduced graphene oxide on gold nanoparticles modified with a polyoxomolybdate film. Highly sensitive non-enzymatic electrochemical detection of H_2O_2, Sensors and Actuators B: Chemical. 258 (2018) 745–756.
2. A. Jabłońska, B. Pałys, Effect of the polymerization bath on structure and electrochemical properties of polyaniline-poly(styrene sulfonate) hydrogels, Journal of Electroanalytical Chemistry. 784 (2017) 115–123.
3. A. Jabłońska, M. Gniadek, B. Pałys, Enhancement of direct electrocatalytic activity of horseradish peroxidase on polyaniline nanotubes, J. Phys. Chem. C. 119 (2015) 12514–12522.
4. P. Olejnik, A. Świetlikowska, M. Gniadek, B. Pałys, Electrochemically reduced graphene oxide on electrochemically roughened gold as a support for horseradish peroxidase, J. Phys. Chem. C. 118 (2014) 29731–29738.
5. A. Świetlikowska, M. Gniadek, B. Pałys, Electrodeposited graphene nano-stacks for biosensor applications. Surface groups as redox mediators for laccase, Electrochimica Acta. 98 (2013) 75–81.
6. P. Olejnik, B. Pałys, A. Kowalczyk, A.M. Nowicka, Orientation of laccase on charged surfaces. Mediatorless oxygen reduction on amino- and carboxyl-ended ethylphenyl groups, J. Phys. Chem. C. 116 (2012) 25911–25918.
7. P. Olejnik, M. Gniadek, B. Pałys, Layers of polyaniline nanotubes deposited by Langmuir–Blodgett method, J. Phys. Chem. C. 116 (2012) 10424–10429.