

26<sup>th</sup> International Conference on **Advanced Nanotechnology**  
&  
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**Materials Technology and Manufacturing Innovations**

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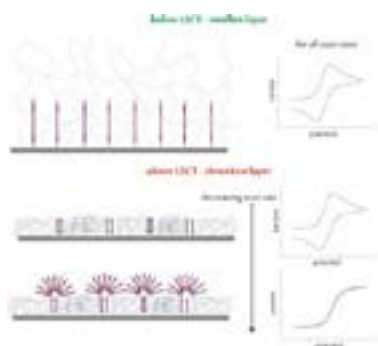


## Zbigniew Jan Stojek

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### Modification of electrodes with a thin film of environmentally sensitive gel to get micro and nano electrode-array behavior

Polymer layers were frequently deposited on electrode surfaces to achieve their desired electrochemical and physicochemical properties. A new trend appeared recently. It is the formation of the so-called intelligent interfaces. They can be obtained by the deposition of a thin layer, on the electrode surface, of a hydrogel that is environmentally-sensitive. This procedure was used to build and develop sensors, biosensors, fuel cells, switchable ON-OFF electrodes, and memimpedance systems. It is well known that in a non-conductive, porous layer that is deposited on the electrode surface, the transport of an electroactive molecule to that surface proceeds rather through the gel channels. In parallel, it was reported; that in the case of non-electro active layers it was possible to obtain very different voltammetric responses. The type of response depended on the structure of the layer and the rate of the potential sweep. In this work, we report the results obtained with electrodes modified with a very thin layer of environmentally sensitive hydrogel. Two methods were used in the preparation of the layers: electrochemically induced polymerization and self-assembly of nano/microgel spheres. The main component of the gels was poly (N-isopropylacrylamide). In the second method, the crosslinkers containing the -S-S- groups were added to the initial mixture of the monomers. Both: swollen or shrunken states of the hydrogel layers were employed in the investigation of the transport of an external redox probe. Depending on the scan rate and the state of the film the voltammetric behavior resembled that of a set of nano/micro-electrodes or that of linear diffusion.



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**Recent Publications**

1. Katz E (2016) Modified Electrodes and Electrochemical Systems Switchable by Temperature Changes. *Electroanalysis* 28:1916-29.
2. Kaniewska K, Karbarz M, Stojek Z (2015) Electrochemical attachment of thermo- and pH-sensitive interpenetrating-polymers-network hydrogel to conducting surface. *Electrochimica Acta* 179:372-8.
3. Karbarz M, Mackiewicz M, Kaniewska K, Marcisz K, Stojek Z (2017) Recent developments in design and functionalization of micro- and nanostructural environmentally-sensitive hydrogels based on N-isopropylacrylamide. *Applied Materials Today* 9:516-32.
4. Menshykau D, Compton RG (2009) Electrodes modified with electroinactive layers: distinguishing through-film transport from pinhole (pore) diffusion. *Langmuir* 25:2519-29.

**Biography**

Zbigniew Jan Stojek is a chemistry professor at Faculty of Chemistry, University of Warsaw. He is an expert in application of functionalized microgels in the drug delivery systems and in construction of sensors and biosensors. He is also active in developing new methodologies in electrochemistry and electroanalysis.

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**Notes:**