

## NOMATEN JUNIOR SEMINAR

### Corrosion resistance of modern Ti-based materials for long-lasting biomedical applications

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#### Abstract:

Commercially pure titanium (CP-Ti) is one of the most widely used metallic material for biomedical applications owing to its unique combination of relatively low stiffness, biocompatibility and high corrosion resistance in the body fluids. However, mechanical strength of CP-Ti is too low to exploit this material in case of load-bearing replacements such as modern narrow dental implants. One of the possible way to overcome this drawback is grain refinement to the nanoscale by large plastic deformation methods. Defects of crystal lattice, introduced during Ti nanostructuring, affect not only mechanical strength but also functional properties such as corrosion resistance. In this talk, I will describe the effect of grain boundaries and dislocations on Ti corrosion performance. Moreover, I will briefly explain my approaches proposed to enhance corrosion resistance of CP-Ti, especially in the solutions containing strong oxidizer –  $H_2O_2$  - a product of human immunological cells as a response for the implantation procedure. Degradation phenomena will be evaluated based on the results of electrochemical tests (EIS, potentiodynamic polarization), microscopic observations (TEM), spectroscopic (AES,XPS) and combined electrochemical-microscopic analysis (EC-AFM).

#### Bio:

Agata Sotniczuk is currently a PhD candidate at the Faculty of Materials Science and Engineering of Warsaw University of Technology. Her scientific work encompasses investigating the effect of microstructure, crystallographic texture and non-toxic alloying elements on the surface properties of Ti-based biomedical materials. Currently she is focusing on the influence of proteins and products of immunological system on the corrosion resistance of modern Ti-based materials (nano CP-Ti) and Ti  $\beta$ -phased alloys with ultra-low stiffness.