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## Cu<sup>2+</sup> detection realized with silicon nanowire ion-sensitive field effect transistor based biosensor

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Copper ions are involved in many metabolic processes as cofactor or structural component, but at high concentration lead to serious health impacts for human beings and animals, like damages to the kidney and liver, Parkinson, Alzheimer, etc. Existing methods are complicated, expensive and do not show a good sensitivity and selectivity. Therefore, development of a precise, fast, and relatively simple sensor for heavy metal ions detection is an important task for environmental and human protection. Si-nanowire ISFET device allows simultaneous detection of different metal ions. Gold coated nanowires of the ISFET device allow modification of the surface with various selective bioreceptors to specific targets and target-receptor reaction leads to a change in a surface potential of the nanowires. Surface of the gold coated nanowires was modified by forming assembly of Lpa-GGH thiol terminated peptide and was used as receptor for detection of copper ions. Upon copper-ligand complexation, we have observed two different areas in the calibration curve at low and high concentration regimes. This can be explained by conformational change and deprotonation of the ligand at low concentration, which creates a negatively charged surface, but at high concentration of copper ions the net charge on the surface stays more positive due to the lower level of ligand deprotonation. For better understanding of these phenomena, we have done time-dependence experiments showing the proton release upon complexation and simulation based on site binding model in good agreement with the experimental results.

### Biography

Olena Synhavska has completed her Bachelor's (Applied Physics) and Master's (High Technologies) Studies at Taras Schevchenko National University of Kyiv (2010-2016). She has worked as an Engineer at V E Lashkaryov Institute of Semiconductor Physics, National Academy of Sciences of Ukraine (2014-2016). During that time, she has published 2 papers. Currently she is doing her PhD at the University of Basel and the Empa (Swiss Federal Laboratories for Materials Science and Technology) with a focus on Biosensors.

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