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Copper II ions sensing using localized surface plasmon resonance

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As modern technology has evolved, the problem to toxicity of nano-scale materials start rising, so it has emerged as an important research project to detect the toxic agents. Especially, according to a recent study, copper II ion greater than normal values increase the growth rate of the tumor, so it is important to measure a low concentration of copper ions. A conventional method for detecting ions is a use of inductively coupled plasma (ICP). But it is expensive and has a hassle things like preprocess of the samples and stabilization of the plasma which is necessary. However, the use of localized surface plasmon resonance (LSPR) is one of the techniques using the optics, so it can detect materials on the substrate in real time easily and quickly. The substrate conjugated with chelators, antibodies, aptamers or ligands can bind the desired materials like ions, proteins, even enzymes and genes. Herein, we made nanoplasmonic substrates using gold nanorods and D-penicillamine (DPA). D-penicillamine (DPA) is easy to conjugate with gold through thiol group. And it is a chelator of the copper, so the DPA is separated from the substrate and combined to the copper II ions. Copper II ion could be detected up to 100 picomolar (pM) concentration by using the nanoplasmonic substrate. It shows a unique selectivity for copper II ions. And we were also able to detect copper in human blood-like environment (limit of detecion is 1 nM). Through this study, not only copper II ions but also other ions can be detected by making the substrate that can be more quickly and easily monitoring for ions.

Biography

Jinsung Park studied Mechanical Engineering in Korea University. His major field is to detect toxic materials. Atomic Force Microscope (AFM) was applied by various methods such as cantilever nano-biosensor, Kelvin Probe Force Microscope and Force curve. His researches were published in major journals such as *Biosensors and Bioelectronics, Nature communication and ACS nano*. His study is supported by the National Research Foundation of Korea (NRF) under Grant no. NRF-2015R1A1A1A05027581 and Korea University Future Research Grant.

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