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Highly sensitive toxicity evaluation using nanotechnology methodology

YoungTae Seo[1, 4], **JuKyung Lee**[2], **Kyuhong Lee**[2], **JongHan Kim**[3] and **HeaYeon Lee**[3, 4]
[1]Queens College City University of New York, USA
[2]Korea Institute of Toxicology, Jeongeup, South Korea
[3]Northeastern University, Boston, USA
[4]Mara Nanotech New York, Inc., Queens, USA

The clinical need for an assay reliably predicting cardiovascular and cardiovascular-related symptoms such as lung injuries is immediate. These symptoms caused by inhalation of hazardous substances in the atmosphere are increasing rapidly and the current technology for evaluation of toxicity has been remained on simple analysis. Demand for evaluation of toxicity by using highly sensitive nanobiosensor is growing rapidly, but research and development levels are insufficient condition. Here we will present a reliable cardiac biomarker (Oxidized LDL, Fibrinogen, Adiponectin, 8-isoprostane) based electrochemical (EC) nanowell array sensor for evaluation of cardiac toxicity in human serum using nanotechnology methodology. EC techniques are rapid, reliable, and the resulting electric signals can be easily amplified and scaled down. These EC nanobiosensors have significantly advanced the biomolecular detection by increasing sensitivity, limit of detection (LOD), multi-targeting, and being label free, compared with conventional ELISA or HPLC. Especially, the nanosensors have extremely low volume on the order of atto-liters per well, and a total volume of approximately 32 femto-liters per array. This research will aid in the early diagnosis of cardiovascular disease, especially in patient throughout worldwide. We already reported that nanowell array electrode can enhance electrochemical detection of molecular binding events by controlling the binding sites of the captured molecules. Using nanowell biosensor based electrochemical analysis, we have detected biological macromolecules such as DNA, proteins or aptamers at extremely low concentrations. We will utilize evaluation of cardiac toxicity system by combining with (1) nanowell array electrode based on nanotechnology and (2) EC measurement.

Biography

YoungTae Seo is currently graduate student at Queens College of the City University of New York, USA.

info@mara-nanotech.com

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