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Magnetic based "Lab-on-a-chip" platform for detection of protein

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A lab-on-a-chip (LOC) is a device that integrates one or several laboratory functions (separation, fluid transport, mixing, and analysis in a compact micro-fluidic system.) on a single chip which deals with the handling of extremely small fluid volumes. Analysis process in LOC can be performed by using optical, electrochemical and magnetic etc. Among these analysis methods, magnetic method via magnetic particles conjugated bio-recognition or inorganic agents are very emerging approach due to biological samples show essentially no magnetic background signal and also magnetic labels are insensitive to pH, ion concentration and surface charges. Planar Hall resistance (PHR) sensors have the great advantages of higher signal-to-noise ratio, small offset voltage at zero fields, very linear response at low field region compare with other magnetoresistive sensors. Different multilayer sensor structures such as bilayer (Ta/NiFe/IrMn/Ta) and spin-valve (Ta/NiFe/Cu/NiFe/IrMn/Ta) have been used for PHR sensor. The newly designed PHR sensor shows the higher sensitivity which is very good candidate for bio-entity detection. The interaction of biotin and streptavidin has been exploited for use in many protein and nucleic acid detection. Because the biotin label is stable and small enabling the streptavidin-biotin interaction to be used for the development of robust and highly sensitive assays. We have performed the detection of streptavidin conjugated with magnetic label and have succeeded to detect a 2.9 femto-molar (fM) concentration. In addition, we developed a sandwich magnetic bioassay system for the detection of thrombin using PHR sensor.

Biography

CheolGi Kim received the B.Sc. (1983) from Seoul National University, Ph.D. (1989) from KAIST (Department of Physics), Korea. He has established the full Professor position in Department of Materials Science and Engineering in Chungnam National University from 2007. He has published more than 200 SCI journal articles, and holds 8 domestic and international patents. Currently he is the Director of NanoBioEngineering and Spintronics, funded from Korea Research Foundation through World Class University program. Prof. Kim is a member of IEEE Magnetics Society since 1991. He has serving General Trustee, The Korean Magnetics Society during 2009-2010, Trustee, The Korean Magnetics Society since 2005, Auditor, Magnetic Chapter of IEEE Seoul Section since

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