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Development of LSPR surfaces for sensitive detection of human placental alkaline phosphatase

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Extracellular vesicles (EVs) with human placental alkaline phosphatase (PLAP) are secreted in maternal body during pregnancy and concentration of PLAP EV has been suspected to give insights about the development of the fetus (Lozo et. al., 2016). Localized surface Plasmon resonance (LSPR) technique has been widely investigated for biosensor applications (Lopez et. al., 2016). It offers high sensitivity in low-volume sample measurements and less device/technique complexity comparing to SPR. In this work, LSPR surfaces having high sensitivity and low non-specific binding properties were developed for detection of PLAP EVs. Gold Nano rods (GNRs) were used to create metal Nano patterns on glass wafers because they exhibit high surface area and plasmatic properties, and better chemical stability in aqueous solutions. GNR surfaces functionalized with PEG (2 kDa or 5 kDa) result in hydrophilic and non-fouling LSPR surfaces. Surfaces prepared using PEG of 2kDa showed better sensitivity with minimum non-specific binding. After immobilization with specific antibodies GNRs with 2 kDa detect PLAP with the detection limit as low as 5 ng/mL.

Biography

Damla Taykoz has completed BSc in Chemical Engineering, Hacettepe University and MSc in Chemical Engineering, Izmir Institute of Technology. She currently continues her PhD studies in Chemical Engineering at Izmir Institute of Technology. Her PhD thesis aims to develop LSPR chip for detection of different biomarkers. She conducted two projects on renewable energy (supported by TUBITAK 2209/A, 2011) and LSPR chip development at University of Washington (supported by TUBITAK 2214/A, 2018). She also worked as a researcher in several projects aiming to develop drug delivery systems via RAFT polymerization.

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