Multiplex Detection of Cancer-Related Proteases Using Magnetic Graphene Oxide

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Decomposition of the primary barriers, basement membrane and extracellular matrix (ECM) is essential for invasion and metastasis of tumors. Recently, researches related to the diagnostics of the various tumors have been attempted by studying the changes of tumor proteases' expression. In particular, matrix metalloproteinases-2 (MMP-2) and urokinase plasminogen activator (uPA) take important roles in invasion and metastasis of tumors. In case of most metastatic cancer cells, degradation of ECM was strongly related with plasmin activation by uPA enzymes, which is followed by activation of MMP sequentially. Here, we report multiplex graphene oxide biosensor magnetized for in-situ peptide synthesis and easy separation as performing protease assay (denoted as MGO). GO micro sheets were magnetized as Fe_3O_4 and the peptide sequences specific to MMP-2 and uPA were synthesized on MGO in situ. FITC and RBITC fluorescence molecules were labeled on them respectively for the multiplex FRET detection. Finally, each FRET-MGO was applied to MMP-2 and uPA assays simultaneously and independently to evaluate the performance as a promising multiplex diagnostic platform.