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Immobilization of Biomolecules onto Graphene Layer-Encapsulated Magnetic Nanoparticles Functionalized by Inductively Coupled Plasma TEGUH ENDAH SARASWATI, AKIHISA OGINO, MASAAKI NAGATSU, Shizuoka University — Magnetic nanoparticles have many great interests in potential to bio-application such as drug delivery system, hyperthermia treatments, magnetic resonance imaging contrast enhancement, etc. Carbon coating of the magnetic nanoparticles can leave the toxicity out without detracting their magnetic properties and stabilize the nanoparticles so that compatible to be used in bioapplications. Among various functional groups, the introduction of amino groups to the particles surface achieves enhanced wettability and improves its adhesion. However, this modification has not been deeply studied on carbon encapsulated magnetic nanoparticles. In fact very few information can be found on the topic of graphene layer-encapsulated iron nanoparticles related to the plasma surface treatment in order to introduce nitrogen-containing group functionalities, such as amino group. In this study, we mainly functionalize the graphene layer-encapsulated magnetic nanoparticles using Ar and ammonia plasma performed by an inductively-coupled RF plasma. After plasma treatment, the biomolecules are immobilized to the particles to test the role of the nitrogen-containing group as a linker to the biomolecules. The XRD, XPS, HR-TEM and EDS elemental mapping were used to characterize and analyze the results.

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