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The formation of bio-corona on graphene and boron nitride ACHYUT RAGHAVENDRA, BISHWAMBHAR SENGUPTA, Clemson Nanomaterials Center, Dept., of Physics and Astronomy, Clemson University, JINGYI ZHU, Clemson Nanomaterials Center, Dept., of Physics and Astronomy, Clemson University, Clemson, SC USA 29634., APPARAO RAO, RAMAKRISHNA PODILA, Clemson Nanomaterials Center, Dept., of Physics and Astronomy, Clemson University, Clemson, Laboratory of Nano-biophysics and COMSET — The increase in applications of engineered two-dimensional (2D) materials has raised concerns over their discharge into the environment. The inadvertent fouling of 2D-materials with natural organic matter (NOM) results in the formation of biocorona, which in turn determines the transport and fate of 2D-materials. Our experiments showed that the physicochemical characteristics of 2D-materials play an important role in biocorna formation. In particular, the formation of biocorona is determined by: i) the amount of aromatic content in NOM, and ii) the distribution of pi-electrons in 2D-materials such as graphene and BN. More importantly, we found that the delocalized pi-electron cloud in NOM results in significant charge transfer while while the charge transfer does not occur for the case of BN wherein the electron cloud is centered near N atoms. A detailed analysis of 2D-material biocorona formation and the impacts on 2D-material transport and fate will be presented.

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