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Wrapping of a single bacterium with Functionalized - Chemically Modified Graphene (FCMG) sheets via highly specific protein-cell wall interaction NIHAR MOHANTY, VIKAS BERRY, Kansas State University — Graphene has recently generated a lot of interest due to its unique structural and electrical properties. It's micro-scale area and sub-nano-scale thickness coupled with ballistic electronic transport at room temperature, low Johnston noise and low charge scattering, have made it a gold mine for novel applications. Since its discovery in 2004, there have been a plethora of studies on characterizing its unique physical, chemical and electrical properties of graphene as well as on integrating it with various physical/chemical systems to utilize these properties. But there have been limited or no studies on the integration of graphene with living microorganisms or mammalian cells. Here we describe the novel wrapping of a single live bacterium (*Bacillus cereus*) with a chemically modified graphene sheet functionalized with the protein Concanavalin-A (Con-A) via the highly specific Con-A - Teichoic acid interaction. We are investigating the structural and the electrical properties of these novel bacteria-FCMG ensembles. Further, we are also interested in characterizing this wrapping process in detail by studying the kinetics and the mechanism of action of bacterial-wrapping via 3D modelling. This is a first step towards the live-bio-nano-integration of graphene which would open up avenues for applications as diverse as bio-batteries using the *Geobacter* to recombinant enzyme compartmentalization.

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