**The development of high performance EMI shielding materials for next generation wearable electronics** **(*New - Winter 2019*)**

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1. Background

Today's leading-edge electronics made of densely integrated circuits produce severely high levels of electromagnetic radiation, which causes adverse effects on sensitive precision electronic equipment and safety of human beings. To address this, the development of high-performance electromagnetic interference (EMI) shielding materials that are lightweight and flexible has become a crucial technical prerequisite for next-generation wearable electronics. Conventionally, metals and metallic composites have been employed as EMI shielding materials, but they suffer from severe oxidation/corrosion, and have poor chemical resistance, unfavourably high density and weight, and are difficult to process. Alternatively, electrically conductive polymer composites integrated with carbon-based fillers can potentially replace conventional metallic composites because of their resistance to chemical oxidation/corrosion, great processibility, lightweight, flexibility and low cost.

2. Objective and Approach

The EMI shielding performance of polymer composites is highly dependent on the intrinsic electrical conductivity, dielectric constant, magnetic permeability, aspect ratio, and content of conductive fillers. It is also very crucial to create a robust inter-connectivity between fillers so that these properties can be realized across the entire composite. Hence, the objective of the proposed research is to take advantage of nanotechnology by developing a three-dimensionally uniformly dispersed array of nano-fillers that can favourably incorporate into polymers. Specifically, the fillers will be nano-engineered into novel nanostructured carbon materials such as graphene, carbon nanotubes, nanowires, nanofibers and nanoribbons. These unique nanomaterials is expected to exhibit superior properties only attainable at nano-scale morphologies (as opposed to bulk) such as extremely high electrical conductivity which in turn will greatly improve EMI shielding efficiency.

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