NOGOS: A Novel Nano-Oligosaccharide Doped Graphene Sand Composite Water Filter for Developing Countries

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A novel nano-oligosaccharide doped graphene sand composite filter (NOGOS) was created to serve as a simple, economical, and effective water filter in developing countries, where fresh water scarcity is a growing concern. Experimentation demonstrated that a graphene sand composite (GSC), created from sugar using a silica catalyst, increases the nano-surface area available for filtration, thus increasing filtration efficiency. Using hydrothermal carbonization, chitosan, a natural oligosaccharide flocculant derived from crustaceans, was used to nano-functionalize graphene and sand as a water filter (NOGOS) to further improve filtration. Common water pollutants in developing countries including bacteria, iron oxide, herbivore faeces, and pond water were filtered with the NOGOS and a GSC filter. The optimized NOGOS reduced the average dissolved solid concentrations by up to 84%, from 844 ppm pre-filtration to 121 ppm post-filtration, consistent with commercial purification results. Additionally, aerobic and anaerobic bacteria were completely eliminated. The NOGOS provides a cost-effective, efficient, and eco-friendly means of creating potable water that meets international water quality standards.

Awards Won:
Fourth Award of $500