Graphene Oxide-Coated Fabrics for Lightweight X-Ray Radiation Shielding

Abstract:

The project focuses on developing lightweight, flexible fabrics coated with graphene oxide (GO) nanoparticles for effective X-ray radiation shielding. Traditional materials like lead, while effective in blocking radiation, are heavy, toxic, and impractical for everyday use in medical environments. By using a layer-by-layer (LBL) technique, graphene oxide is applied to medical fabrics commonly used for scrubs and gowns, creating a novel material that combines flexibility, breathability, and radiation protection.

Fig 1. Illustration of radiation shielding using different materials.

Objectives:

- Develop lightweight protective fabrics by applying graphene oxide coatings to enhance radiation shielding capabilities while maintaining flexibility and comfort.
- Test the effectiveness of GO-coated fabrics in blocking X-ray radiation compared to traditional materials, like lead, by simulating clinical X-ray procedures.
- Ensure material properties such as air and water permeability, low film thickness, and durability remain intact despite the addition of protective layers.
- Introduce an eco-friendly alternative to toxic, heavy materials like lead in medical and other radiation-prone environments, promoting safer and more comfortable use for medical staff and patients.

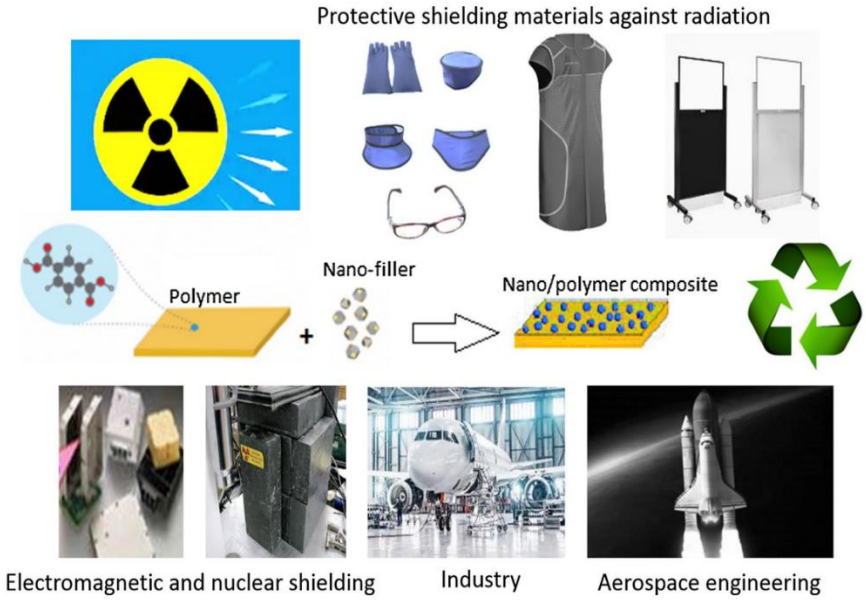

Fig 2. The use of nano-composite materials for manufacturing radiation shielding and their applications in various fields such as electromagnetic and nuclear shielding, industry, and aerospace engineering.

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