

Continuous Dyeing of Graphene and Polyaniline on Textiles for Electromagnetic interference Shielding: An Application of Intelligent Fabrics

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Abstract : Background: The increasing presence of electromagnetic interference (EMI) requires the development of effective protection solutions. Intelligent textiles offer a promising approach due to their wear ability and the possibility of integration into everyday clothing. In this study, the use of graphene and polyaniline for EMI shielding on cotton fabrics was examined. Methods: In this study, the continuous dyeing of recycled graphite-derived graphene and polyaniline was examined. Bottom-reforming technology was adopted to improve adhesion and achieve uniform distribution of conductive material on the fiber surface. The effect of material weight ratio on fabric performance and X-band EMI shielding effectiveness (SE) was evaluated. Significant Findings: The dyed cotton fabrics incorporating graphene, polyaniline, and their combination exhibited improved conductivity. Notably, these fabrics achieved EMI SE values ranging from 9 to 16 dB within the X-band frequency range (8-9 GHz). These findings demonstrate the potential of this approach for developing intelligent textiles with effective EMI shielding capabilities. Additionally, the utilization of recycled materials contributes to a more sustainable shielding solution.

Keywords : Intelligent textiles, graphene, polyaniline, electromagnetic shielding, conductivity, recycling

Conference Title : ICNMA 2024 : International Conference on Nanotechnology Materials and Applications

Conference Location : Paris, France

Conference Dates : December 30-31, 2024