



Graphene is an interesting carbon allomorph with interesting electrical conductivity and mechanical and thermal properties. It has rich chemistry that can contribute to reactions, either as a reducing agent, as an electron donor, or an oxidiser as an electron acceptor owing to its electronic structure. Extraordinary electronic properties in graphene are due to the high quality of its 2D crystal lattice.

The purpose of this thesis is to develop an interdisciplinary research and education programme in textile technology, textile design, textile chemistry, electrochemistry, and wastewater treatment.

Milad's PhD is within the Advanced textile structures research group at the University of Borås. In this group, the focus is on the development of new textile structures, yarn structures, and sustainable fibres. His study focuses on enhancing the performance of dip-coating yarns and fabrics with graphene oxide as well as chemical reduction of graphene oxide to graphene to obtain electrical and other smart properties of the textile. The resulting textiles could be used in many applications, such as electrostatic discharge, supercapacitors, health monitoring, and diagnostic systems, energy harvesting, wastewater treatment, environmental remediation systems, photonic, luminescence, and UV blocking, antibacterial, colour change, electrothermal heating elements, tactile sensors, among others.

Among these applications, the focus of this thesis is on electrothermal heating elements, tactile sensors, as well as iron immobilisation on resulting graphene-coated textiles for wastewater treatment in both catalyses (bio-Fenton) and electrocatalysis systems (electro-Fenton). This thesis provides new perspectives on the integration of graphene and zerovalent iron into textiles in designing heterogeneous catalysts and electrocatalysts for environmental and green chemistry and electrochemistry applications.

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DOCTORAL THESIS

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Textiles and Fashion

Milad Asadi Miankafshe

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THE SWEDISH SCHOOL
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