

Title : Architectural design and affecting factors of MXene-based textronics for real-world application

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Abstract: Today, textile-based wearable electronic devices (textronics) have been developed by taking advantage of nanotechnology and textile substrates. Textile substrates offer flexibility, air permeability, breathability, and wearability, whereas, using nanomaterials offers numerous functional properties, like electrical conductivity, hydrophobicity, touch sensitivity, self-healing properties, joule heating properties, and many more. For these reasons, textronics have been extensively used in many applications. Recently, new emerging two-dimensional (2D) transition metal carbide and nitride, known as MXene, nanomaterials have been highly considered for developing textronics because the surface functional groups and hydrophilicity of MXene nanoflakes allow the facile fabrication of MXene-based textronics. In addition, MXene nanosheets possess excellent electroconductivity and mechanical properties as well as large surface area, which also give numerous opportunities to develop novel functional MXene/textile-based wearable electronic devices. Therefore, this review summarizes the recent advancements in the architectural design of MXene-based textronics, like fiber, yarn, and fabric. Regarding the fabrication of MXene/textile composites, numerous factors affect the functional properties (*e.g.* fabric structure, MXene size, *etc.*). All the crucial affecting parameters, which should be chosen carefully during the fabrication process, are critically discussed here. Next, the recent applications of MXene-based textronics in supercapacitors, thermotherapy, and sensors are elaborately delineated. Finally, the existing challenges and future scopes associated with the development of MXene-based textronics are presented.

Keywords: Textronics, Wearable Electronics, MXene, Nanotechnology, Textile Substrates, MXene/Textile Composites, Electrical Conductivity, Supercapacitors, Sensors, Thermotherapy.

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