Workshop « Soft Material Models »

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REVOLUTIONIZING TEXTILES: XEROGELS AND COATED TECHNIQUES FOR WATER REPELLENCY

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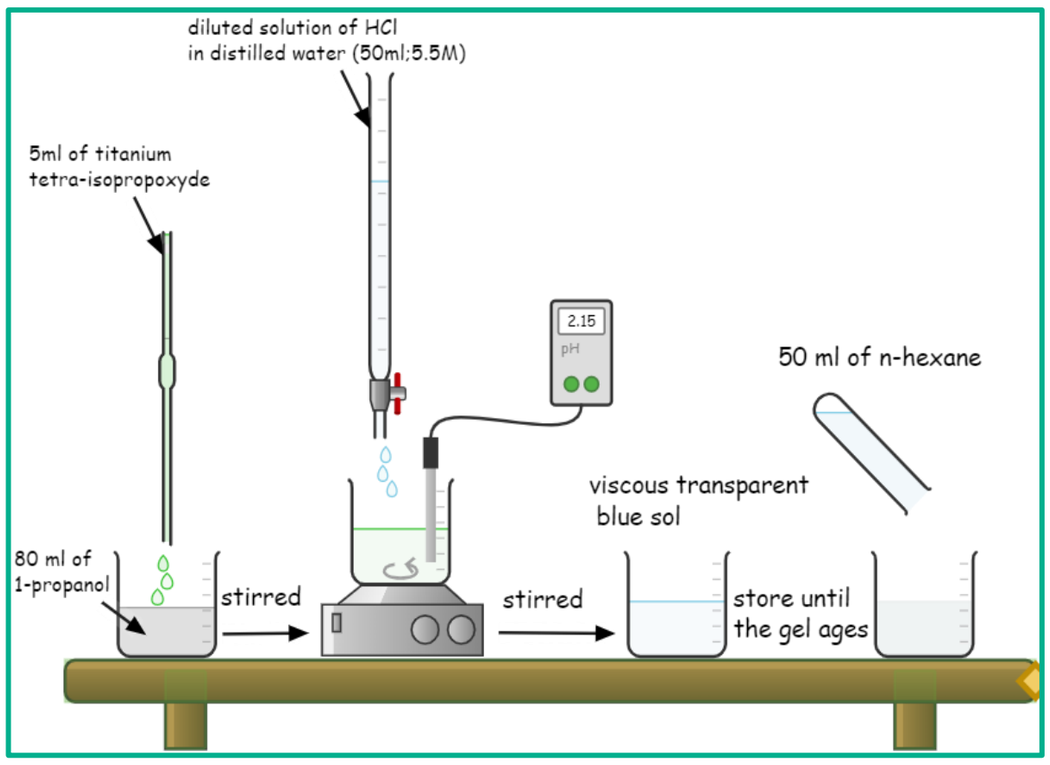
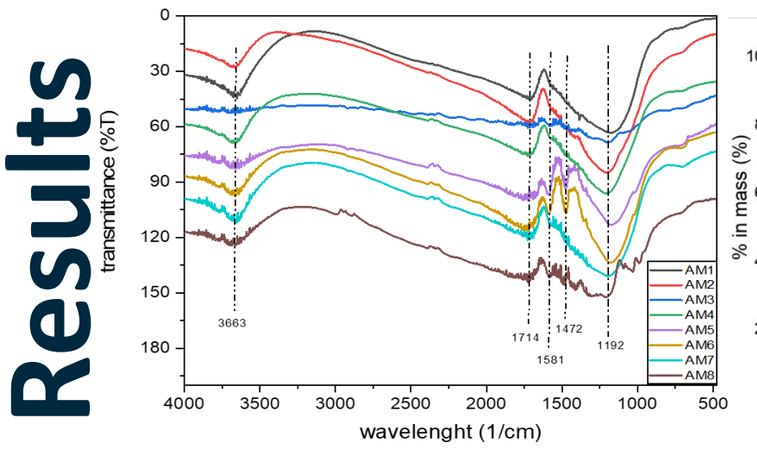
Abstract

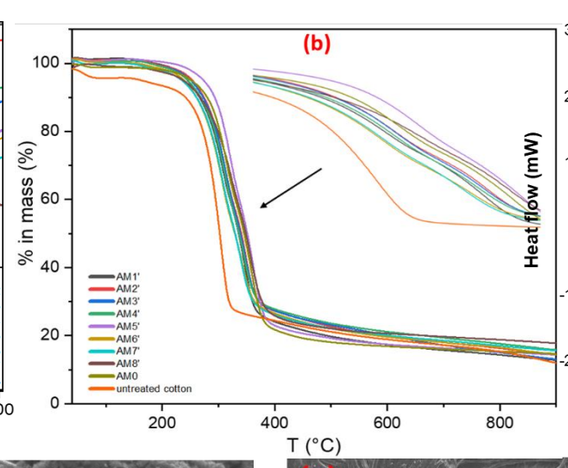
Titanate xerogels have gained significant attention due to their exceptional properties, including thermal conductivity, fire resistance, hydrophobicity, and low density. This study focuses on the development of a novel multifunctional textile by incorporating xerogel as a filler for cotton fabric, specifically for technical textile applications. The results demonstrate that the treated fabrics exhibit hydrophobic characteristics, with contact angles greater than 90°. The final contact angle varies based on the drying temperature of the treated fabrics and can reach a maximum value of 127.50±5°. These values are highly suitable for technical textile applications. Consequently, the deposition of a titanate xerogel coating results in the creation of a multifunctional textile with immense potential for applications in smart clothing and personal heating[1]–[3].

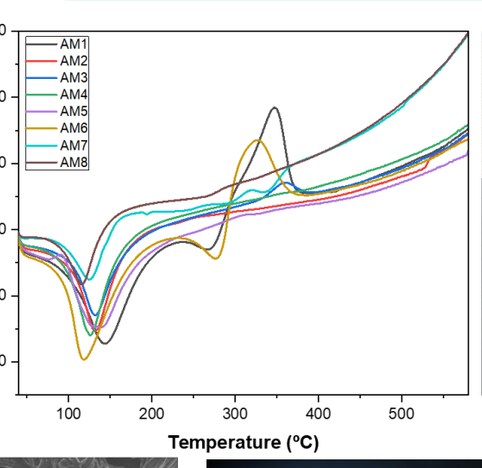
Methodology

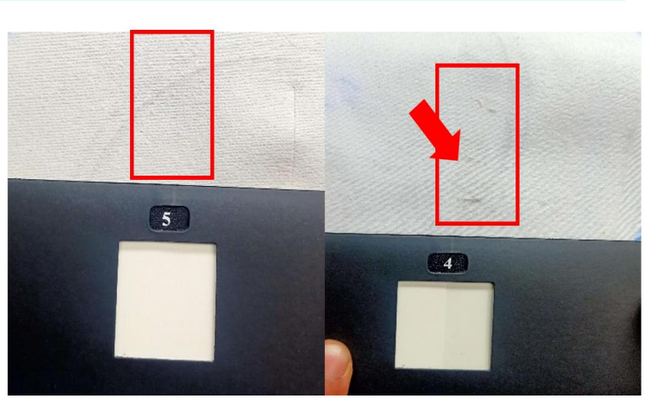


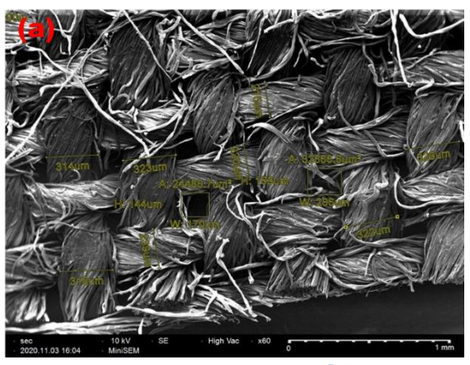
Results

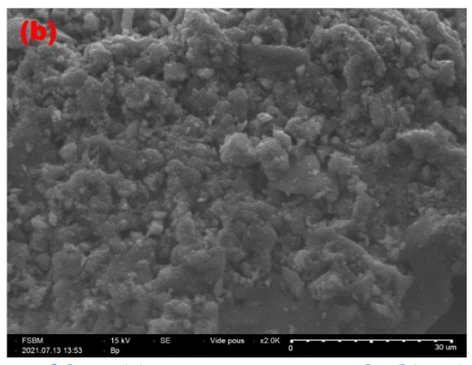


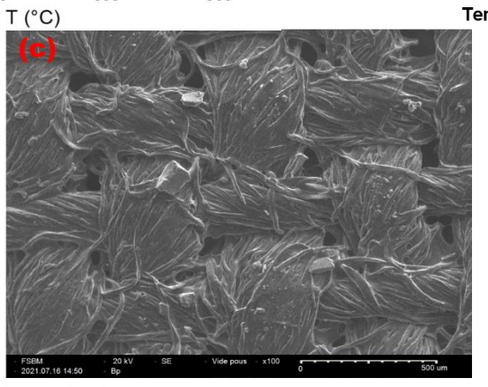




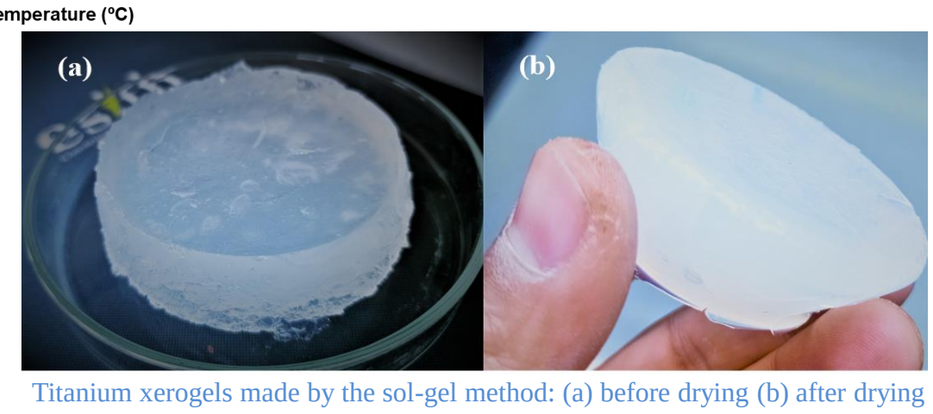




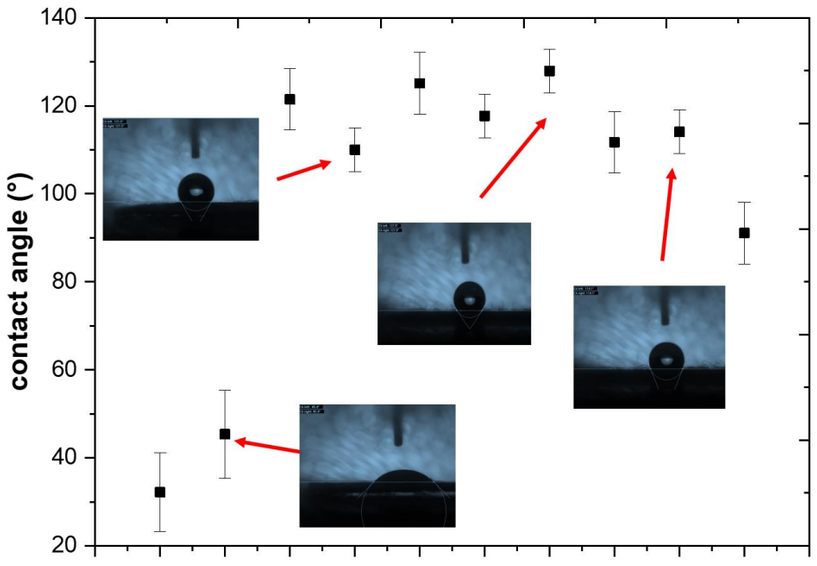


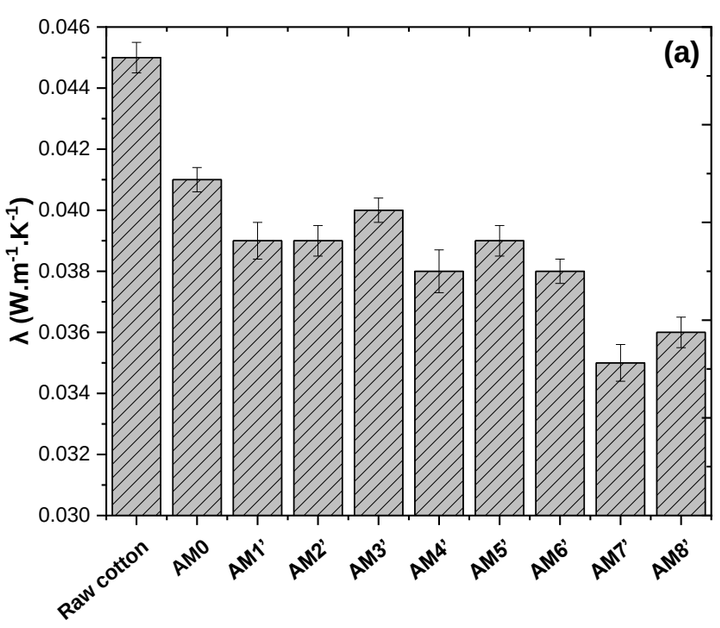


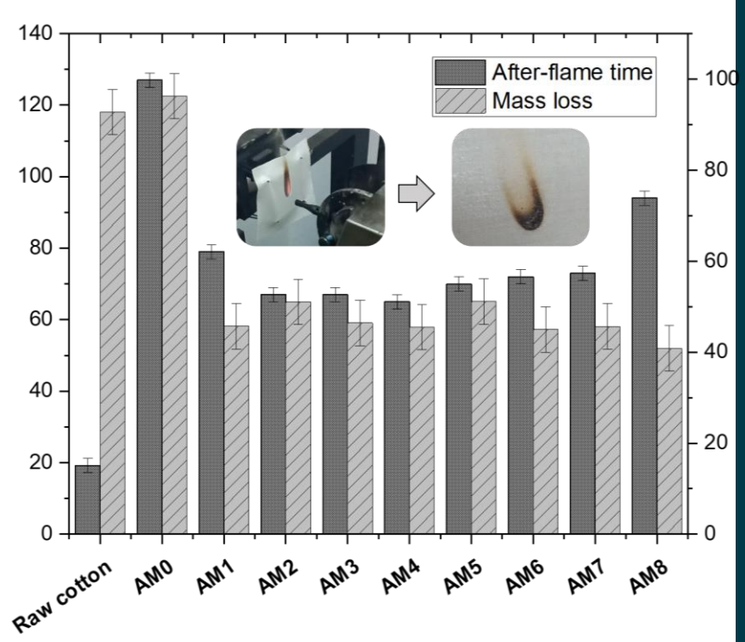
SEM images; Raw fabric (a) ; Titanium Xerogels (b) ; (c) Coated fabric



Titanium xerogels made by the sol-gel method: (a) before drying (b) after drying







Conclusion and perspectives

The results show good adhesion between the sample components, which has been confirmed by the SEM plates. The exchange as well as the modification has been proven by thermal conductivity measurement, resulting in the hydrophobic behavior. The results obtained from this study can be useful to develop new low cost, sustainable, and environmentally friendly materials

References

[1]M. Assal et al., "Multifunctional textile based on titanium xerogel: performance optimization through composition and microstructure," J Sol-Gel Sci Technol, vol. 106, no. 3, pp. 672–683, Jun. 2023, doi: 10.1007/s10971-023-06102-0.

[2]M. Assal, M. E. Wazna, K. Oumghar, M. E. Bouchti, A. E. Bouari, and O. Cherkaoui, "Silica-Xerogel Coated Cotton as Multifunctional Textile: Development and Characterization," IOP Conf. Ser.: Mater. Sci. Eng., vol. 1266, no. 1, p. 012022, Jan. 2023, doi: 10.1088/1757-899X/1266/1/012022.

[3]R. Baetens, B. P. Jelle, and A. Gustavsen, "Aerogel insulation for building applications: A state-of-the-art review," Energy and Buildings, vol. 43, no. 4, pp. 761–769, Apr. 2011, doi: 10.1016/j.enbuild.2010.12.012.