Prospects of Catechol-based functionalization of various polymeric substrates

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Abstract: Functionalization of materials is an extensively utilized method that enables materials to acquire new properties. The prospect of developing a coating employing catechol is derived from a protein found in mussels that endure constant water exposure while clinging to rocks. It can be concluded that catechol-based coatings exhibit excellent adhesion and stability. Through the addition of appropriate agents to the coatings, the properties of the surfaces can be manipulated to acquire new characteristics. For instance, incorporating silver nanoparticles into the coating can impart antibacterial properties. The developed coatings have a wide range of potential applications, including textiles, biomedical uses, and water filtration. The application of catechol with Tris(2-aminoethyl)amine (TAEA) for different textiles was carried out. Different chemical substrates were combined with catechol, such as diethylenetriamine (DETA), ethanolamine (ETA), and cysteamine. The coating of catechol-cysteamine was then optimized through experimentation. In this study, a previously developed and optimized CAT-TAEA coating for PVDF filtration membranes was tested on a variety of other materials. The tested materials included flat sheet polyamide, Kevlar fibers, Spectra yarn, cotton woven fabric, glass filaments, melamine formaldehyde foam, copper-coated polyester nonwoven, and nanofibrous polyamide membrane.

Keywords: *Surface modification, coating, catechol, materials functionalization, optimization*

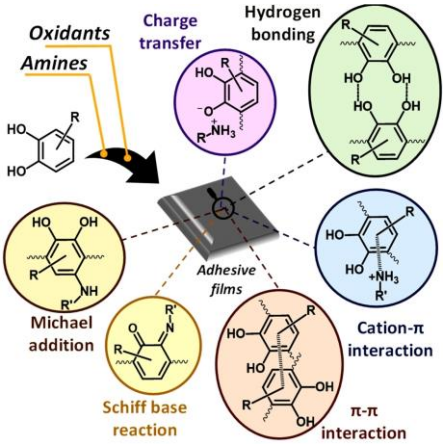

Figure 1. SEM images of a) pristine PVDF nanofibers b) PVDF

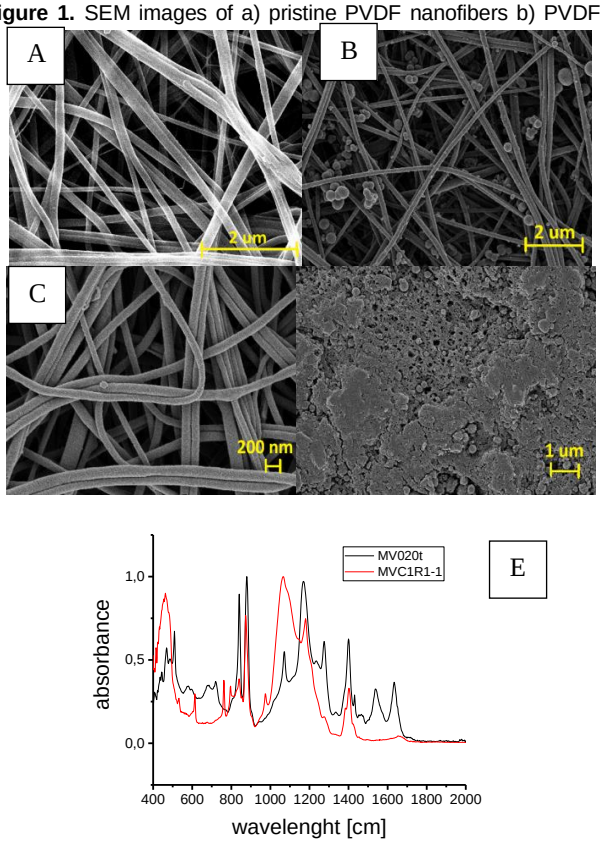

Figure 1. SEM images of a) pristine PVDF nanofibers b) PVDF nanofibers during optimization c) coated PVDF nanofibers after reaction optimization d) clogged flat sheet PVDF membrane after too long treatment. E) Comparison of FTIR spectrum of pristine and coated catechol-cysteamine flat sheet PVDF membrane

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