

ABSTRACT

This study aims to develop a superhydrophobic coating based on ZnO-SiO₂/HMDS on cotton fabric with high mechanical durability and UV stability. The synthesis methods used are Sol-Gel and precipitation to produce an optimal micro-nano structure, applied using a dip-coating method. Characterization was carried out Using UV-Vis, absorption was observed at 380 nm, FTIR showed a peak at 1064 cm⁻¹ confirming the formation of Si-O-Si and Si-O-Zn bonds, indicating the formation of an inorganic-organic hybrid structure through silanol condensation. The peak at 452 cm⁻¹ indicates that the ZnO crystal structure remains stable after coating, and the Water Contact Angle (WCA) test resulted in very high contact angles of 163° and 161.8° and a sliding angle around of 10° were obtained. This research could open up opportunities for water-resistant functional fabric applications in the textile industry and environmental protection.

Keywords: Superhydrophobic, ZnO-SiO₂, HMDS, Dip-coating, Seed Layer, Functional Textile.