Abstract

The successful synthesis of Cobalt Manganese Oxide thin films with variation of molarities (M=0.025 M, 0.05 M, 0.1 M, 0.2 M) has been confirmed. All the produced samples underwent thorough characterization and examination utilizing XRD, FTIR, and UV-Vis spectroscopic techniques. The alterations in molarity within the thin film samples have a noticeable impact on their structural, optical, and electrochemical characteristics. XRD analysis indicates that all the produced samples exhibit an amorphous structure. The FTIR spectra display prominent absorption peaks in the 400-900 cm -1 range, which strongly support the successful synthesis of Cobalt Manganese Oxide thin films. We have effectively produced electrodes for all the prepared samples using the spray pyrolysis method and thoroughly assessed their wettability, antibacterial capabilities, and photocatalytic properties. Examination of the thin films' wettability demonstrates that the surface transitioned from being hydrophilic to hydrophobic as the molarity shifted from 0.025 M to 0.02 M. The antibacterial activity improved as the molarity increased from lower to higher values. The photocatalytic performance improved with increasing molarity, achieving nearly 99% degradation of methylene blue dye. When employing a 6 M KOH solution as an electrolyte, 0.1 M thin film exhibited a specific capacitance of 4342.22 Fg -1 through CV, making it a prospective electrode material for future supercapacitor production, aimed at creating high- performance energy storage devices.