Invention of a Novel Detection Kit Based on Thiourea Doped Cellulose for Antibacterial Film's Validity

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This study aims to create a cellulose-based ion sensor that can easily detect the validity of antibacterial films made of copper or silver ions that are used to prevent COVID-19. Thiourea 4.6% and Imidazole 3.1% were able to be doped on the surface of cellulose. But, due to the heat-induced effect during synthesis, the saturation of the dopant, and the steric effect of each dopant, it was impossible to dope thiourea and imidazole simultaneously. According to FT-IR, TGA, and EDX analysis, it was discovered that both dopants were linked to the base material by physical adsorption. Cellulose treated with thiourea was able to detect Ag+ ion and Cu+ ion, while the cellulose-imidazole complex was able to detect Cu2+ ion. By applying the 3.3(Sy/S) formula, the limit of detection (LOD) calculated for each sensor was 4.3×(10)^(-5) and 5.3×(10)^(-5) for Cu2+ ion and Ag+ ion, respectively. To detect both Ag+ and Cu+ ions with a single substance, hydrogen peroxide was treated in a Cu+ ion solution to oxidize the ion to Cu2+. When this was done, both Ag+ and Cu2+ ions were able to detect with only the usage of thiourea doped cellulose. As a result of applying this ion sensor to commonly utilized antibacterial films, several antibacterial films showed color change.