**PAN/TiO2 nanocomposite for the effective photo-degradation of methylene blue dye**

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The nanocomposite film composing of PAN/TiO2 was prepared in N, N’-dimethylformamide for the photocatalytic degradation of wastewater containing methylene blue dye. The PAN/TiO2 film was characterized using infrared spectroscopy, ultraviolet-visible spectrophotometry and x-ray diffraction. The UV-Vis absorption spectra of methylene blue solution has a wavelength range of 400 -700 nm with a peak wavelength of maximum absorbance at 665 nm used to quantify the dye. The PAN-TiO2 film was used in the degradation of the blue dye, beginning with an initial dye concentration (D=1.02) which decreased to D=0.48 after 2 hours. After thermal treatment for 1 hour at 150 °C with oven, infrared spectroscopy analysis was used to confirm the modification of PANpolymer. The peak at 1563 cm-1 which characterizes a heating degree shows cyclization accompanied by the formation of the conjugated bond system. Also, the oxidation of PAN due to the thermal treatment is displayed by the peak at 1730cm-1. The formation of chemical bonds between PAN and TiO2 is also confirmed by infrared spectroscopy as shown by peak at 679 cm-1. The crystallite size of TiO2 was calculated using the X-ray diffractogram (λ =2.289 Å for CrKα radiation) by the Debye-Sheerer equation and found to be around 26 nm. To highlight the significant effect of thermal treatment on dye degradation efficiency, two films of PAN/TiO2, one thermally treated for 1 hour at 150 °C and the other one not, were subjected to methylene blue dye for 30 minutes. About 33.8 % of methylene blue was degraded by the thermally treated PAN/TiO2 film while 10.8 % was achieved by the film that was not thermally treated.