Photocatalytic degradation of methylene blue dye by F-doped Co$_3$O$_4$ nanowires

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**Abstract**

The hydrothermal method was used to prepare Co$_3$O$_4$ with different shapes by varying concentration of NaOH from 3 to 12 M. Shape of Co$_3$O$_4$ was found to be nanowire by using 9 M NaOH. Fluorine was doped into the surface of Co$_3$O$_4$ nanowire by impregnation method. Doping of fluorine into the surface of Co$_3$O$_4$ nanowire decreases bandgap of Co$_3$O$_4$ nanowire from 2.49 to 2.32 eV as a result of the blocking of some pores of Co$_3$O$_4$ nanowire. The surface area of undoped Co$_3$O$_4$ nanowire is higher than that of doped Co$_3$O$_4$ nanowire. Doping of fluorine into surface of Co$_3$O$_4$ nanowire enhances the photocatalytic performance of Co$_3$O$_4$ nanowire toward degradation of methylene blue dye under visible light.

**Keywords:** Co$_3$O$_4$; Hydrothermal; Fluorine; Methylene blue dye

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