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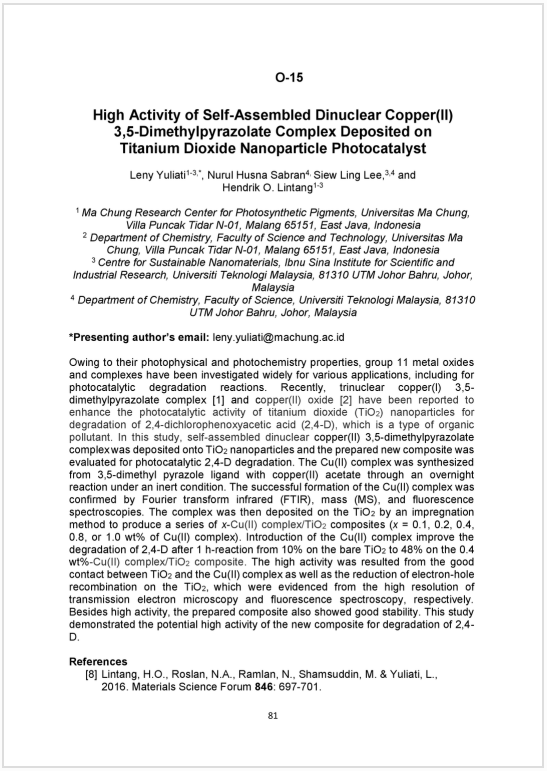

O-15

High Activity of Self-Assembled Dinuclear Copper(II) 3,5-Dimethylpyrazolate Complex Deposited on Titanium Dioxide Nanoparticle Photocatalyst

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Owing to their photophysical and photochemistry properties, group 11 metal oxides and complexes have been investigated widely for various applications, including for photocatalytic degradation reactions. Recently, trinuclear copper(I) 3,5-dimethylpyrazolate complex [1] and copper(II) oxide [2] have been reported to enhance the photocatalytic activity of titanium dioxide (TiO_2) nanoparticles for degradation of 2,4-dichlorophenoxyacetic acid (2,4-D), which is a type of organic pollutant. In this study, self-assembled dinuclear copper(II) 3,5-dimethylpyrazolate complex was deposited onto TiO_2 nanoparticles and the prepared new composite was evaluated for photocatalytic 2,4-D degradation. The Cu(II) complex was synthesized from 3,5-dimethyl pyrazole ligand with copper(II) acetate through an overnight reaction under an inert condition. The successful formation of the Cu(II) complex was confirmed by Fourier transform infrared (FTIR), mass (MS), and fluorescence spectroscopies. The complex was then deposited on the TiO_2 by an impregnation method to produce a series of *x*-Cu(II) complex/TiO_2 composites (*x* = 0.1, 0.2, 0.4, 0.8, or 1.0 wt% of Cu(II) complex). Introduction of the Cu(II) complex improve the degradation of 2,4-D after 1 h-reaction from 10% on the bare TiO_2 to 48% on the 0.4 wt%-Cu(II) complex/TiO_2 composite. The high activity was resulted from the good contact between TiO_2 and the Cu(II) complex as well as the reduction of electron-hole recombination on the TiO_2, which were evidenced from the high resolution of transmission electron microscopy and fluorescence spectroscopy, respectively. Besides high activity, the prepared composite also showed good stability. This study demonstrated the potential high activity of the new composite for degradation of 2,4-D.

References

[8] Lintang, H.O., Roslan, N.A., Ramlan, N., Shamsuddin, M. & Yuliati, L., 2016. Materials Science Forum **846**: 697-701.

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