

**PREPARASI DAN KARAKTERISASI TiO₂ TERMODIFIKASI
CAMPURAN OKSIDA SnO₂ DAN CeO₂ UNTUK MENINGKATKAN
AKTIVITAS FOTODEGRADASI METILEN BIRU DI BAWAH SINAR
TAMPAK**

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INTISARI

Modifikasi fotokatalis TiO₂ dengan campuran oksida SnO₂ dan CeO₂ telah dilakukan. Penelitian ini bertujuan untuk menghasilkan fotokatalis yang dapat mendegradasi zat warna metilen biru pada sinar tampak. Sintesis SnO₂/CeO₂/TiO₂ dilakukan dengan metode presipitasi yang meliputi proses pelarutan reaktan menggunakan HNO₃ dan pengendapan kembali dengan larutan NaOH. Endapan kemudian dikeringkan dan dikalsinasi pada suhu 650 °C. Hasil sintesis dikarakterisasi dengan XRD, DRUV, FTIR, SEM-EDX dan *Photoluminescence*. Rasio Sn/Ce yang optimal ditentukan melalui uji fotodegradasi metilen biru di bawah sinar tampak. Kondisi optimum fotodegradasi ditentukan dengan mempelajari pengaruh pH, massa fotokatalis, waktu penyinaran dan konsentrasi zat warna.

Hasil penelitian menunjukkan bahwa adanya peningkatan aktivitas fotokatalis SnO₂/CeO₂/TiO₂ pada sinar tampak. Variasi optimal diperoleh pada rasio Sn/Ce 1:1 yang menghasilkan penurunan konsentrasi metilen biru sebesar 87%. Peningkatan aktivitas fotokatalitik SnO₂/CeO₂/TiO₂ dipengaruhi oleh penurunan energi celah pita dan penghambat rekombinasi. Kondisi optimum fotodegradasi metilen biru oleh SnO₂/CeO₂/TiO₂ sebesar 85,5%.

Kata Kunci: presipitasi, kombinasi semikonduktor, metilen biru, dan TiO₂

**PREPARATION AND CHARACTERIZATION OF TiO₂ MODIFIED
WITH MIXED OXIDES SnO₂ AND CeO₂ TO INCREASE ITS
PHOTODEGRADATION ACTIVITY OF METHYLENE BLUE UNDER
VISIBLE LIGHT**

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ABSTRACT

Modification of TiO₂ with a mixture of SnO₂ and CeO₂ has been carried out. This study aims to modify TiO₂ that can actively degrade methylene blue dye under visible light. The synthesis of mixed oxides SnO₂/CeO₂/TiO₂ was carried out by the precipitation method which included dissolving the reactants using HNO₃ and re-precipitation with NaOH solution. The precipitate was then dried and calcined at 650 °C. The calcined products were characterized by XRD, DRUV, FTIR, SEM-EDX and photoluminescence spectroscopy. The optimal Sn/Ce ratio was determined by the photodegradation test of methylene blue under visible light. The optimum conditions for photodegradation were determined by studying the effect of pH, photocatalyst mass, irradiation time and dye concentration.

The results showed that the photodegradation of MB under visible light using mixed oxides SnO₂/CeO₂/TiO₂ is higher than that of TiO₂, SnO₂ and CeO₂. The preparation of mixed oxides SnO₂/CeO₂/TiO₂ using Sn/Ce ratio of 1:1 showed the highest photodegradation of MB up to 87%. The high photocatalytic activity of SnO₂/CeO₂/TiO₂ under visible light because a low in band gap energy and the ability to retard the recombination process. The optimum condition of photodegradation of methylene blue by SnO₂/CeO₂/TiO₂ is 85,5%.

Keyword: precipitation, a combination of semiconductors, methylene blue, and TiO₂