

Fabrication and photocatalytic activity of TiO₂/Ti composite films by mechanical coating technique and high-temperature oxidation

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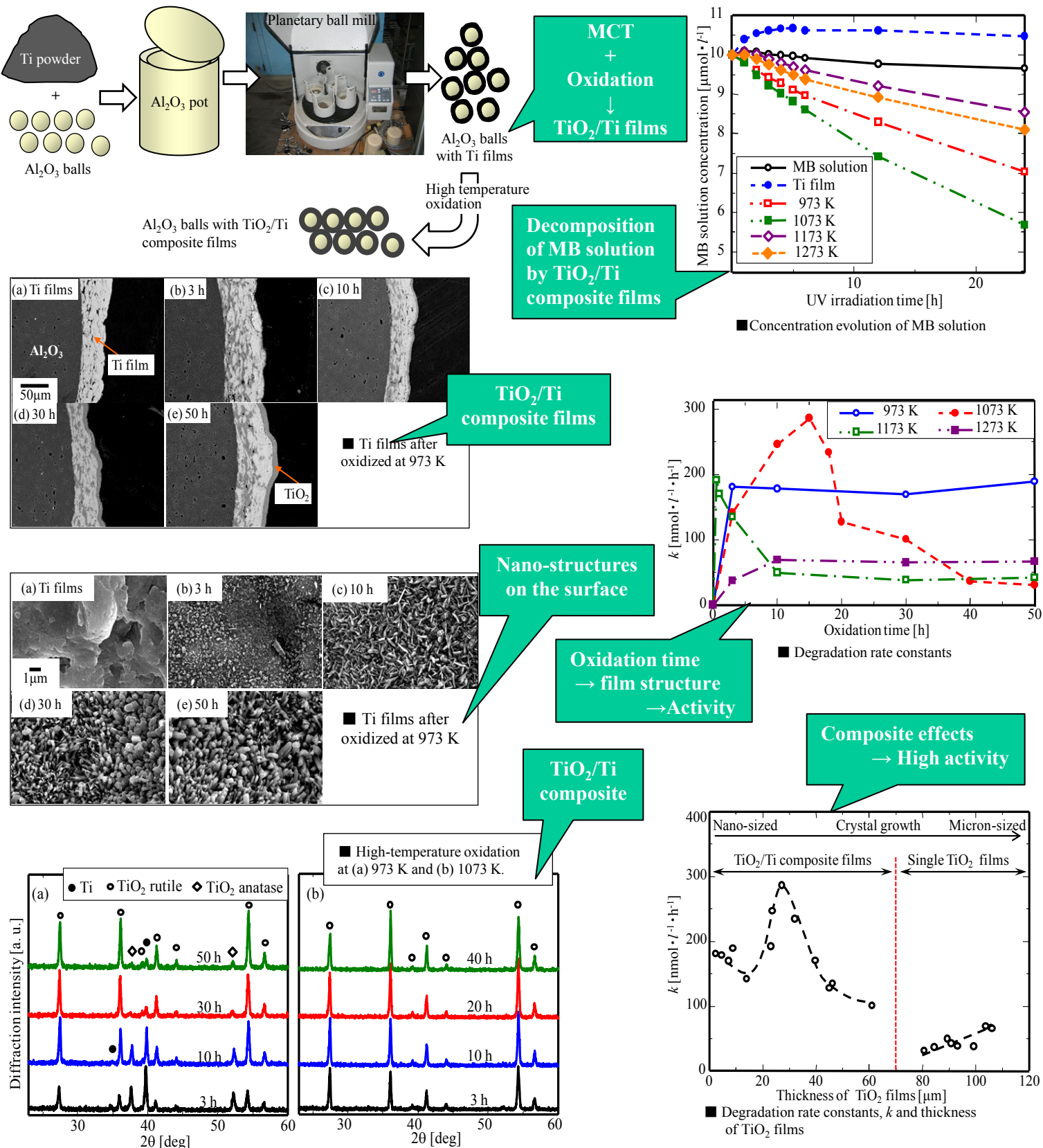
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Aim: MCT + High temperature oxidation → TiO₂/Ti composite films on alumina balls → Composite effects → High photocatalyst performance

Experiment: Mechanical coating technique was used to fabricate titanium (Ti) films on alumina (Al₂O₃) balls. The following high-temperature oxidation was carried out for oxidizing the Ti films to form TiO₂. The oxidation behavior of the films and the microstructure evolution of the oxidized films were investigated.



Summary: The inner and surface layers of the Ti films were oxidized simultaneously. When oxidizing at a relatively low oxidation temperature in a short time, TiO₂/Ti composite films were obtained. With increase in oxidation temperature and oxidation time, the thickness of TiO₂ increased and eventually Ti films were totally oxidized to TiO₂ films. Meanwhile, TiO₂ needles grew up and became columnar crystals which also grew up with the increase of the oxidation temperature and oxidation time. The photocatalytic activity of the oxidized films was examined and discussed. Compared with the single TiO₂ films, TiO₂/Ti composite films showed much higher photocatalytic activity. The highest photocatalytic activity was achieved when the thickness of TiO₂ films in TiO₂/Ti composite films was 27 μm.