

Synthesis and Characterization of Photocatalytic Titanium Oxide Thin Film Deposited on Glass by Atmospheric Pressure Plasma CVD

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Herein, we report on the deposition and characterization of titanium oxide thin films deposited by atmospheric pressure plasma CVD and on the study of their photocatalytic properties.

This access permits deposition at lower temperatures and easy than normally used in atmospheric pressure based processing. The surface morphology is evidenced by SEM. The transmittance of thin film as well as the material band gap are determined by UV/Vis spectroscopy. The chemical composition is obtained by X-ray Photoelectron Spectroscopy and the crystallinity is assessed by X-ray Diffraction and Raman spectroscopy. Methylene blue degradation in water is performed and monitored by UV/Vis measurement in order to assess the photocatalytic properties of the deposited material.

1. Introduction

Titanium dioxide, TiO₂, has received much attention during the last years due to its photocatalytic properties. Indeed, various applications can be obtained by deposition of TiO₂ thin films such as self-cleaning surfaces and pollutant degradation. Atmospheric pressure plasma deposition appears to be a versatile environmentally friendly process for low-cost and high rate deposition of photoactive metal oxide thin films [1,2]

The majority of works in this area has been conducted using vacuum systems, which leads to many limitations, *e.g.* high running costs, compared to atmospheric pressure processes.

In this work, deposition was performed at atmospheric pressure, facilitating in-line process implementation.

3. Conclusion

In conclusion, the atmospheric pressure approach reported here appears to be a promising method for the deposition of titanium oxide thin films for photocatalytic applications.

4. References

- [1] H Fakhouri, 'Highly efficient photocatalytic TiO₂ coatings deposited by open air atmospheric pressure plasma jet with aerosolized TTIP precursor', J. Phys. D: Appl. Phys., 47, 265301, 2014
- [2] Q Chen, 'Deposition of photocatalytic anatase titanium dioxide films by atmospheric dielectric barrier discharge', Surf. Coat. Tech., 310, 173–179, 2017

2. Experimental Part

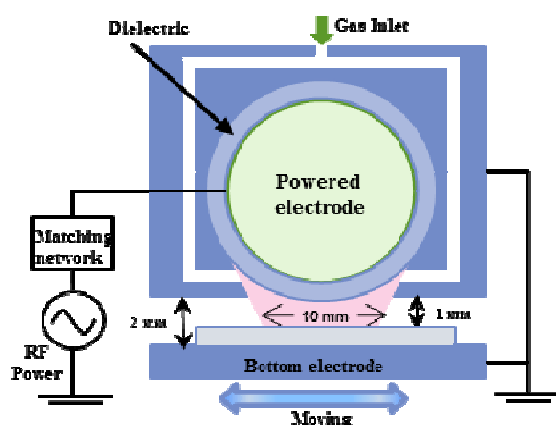


Figure1. Schematic diagram of atmospheric pressure plasma