

Indoor air quality improvement

The application of photocatalytic oxidation

Subject

More and more attention is being paid to the indoor air quality due to its important role on human health. Traditional indoor air purification methods like controlling pollutant sources, increasing air exchange, and using air purifiers have many disadvantages. Therefore the possibility of applying photocatalytic oxidation (PCO) technology to increase indoor air quality is investigated in the present study.



Figure 1: PCO experiment set-up.

Goal

With Nitric oxide (NO) as target indoor air pollutant, this research aims at applying the photocatalytic oxidation theory for the indoor air quality improvement, and the study of the influence of indoor air conditions on the PCO effect.

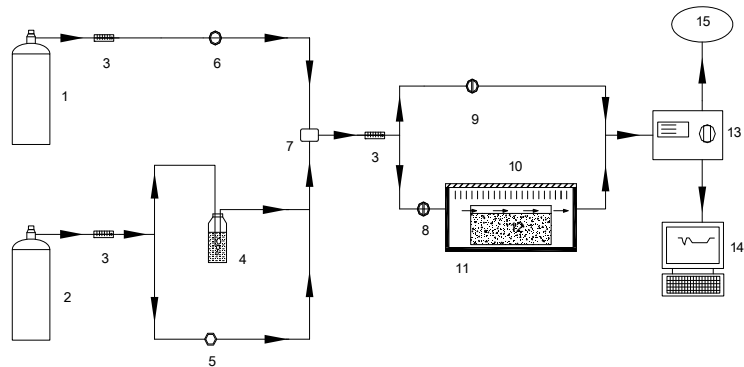


Figure 2: Schematic diagram of the PCO procedure.

Expected Results

1. The Development of the novel air purifying technology for the indoor air quality improvement;
2. Description of the influence of the indoor air conditions on the PCO effect.

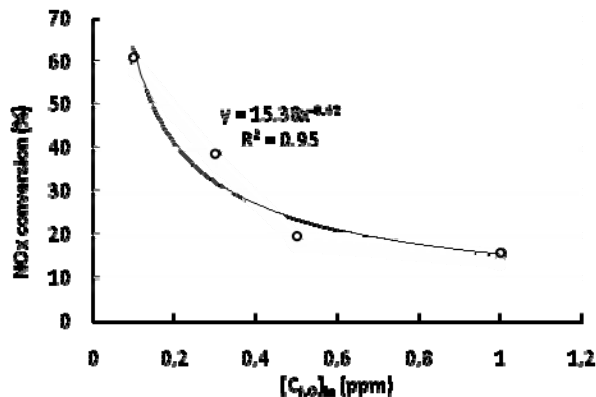


Figure 3: The influence of inlet NO concentration on PCO.

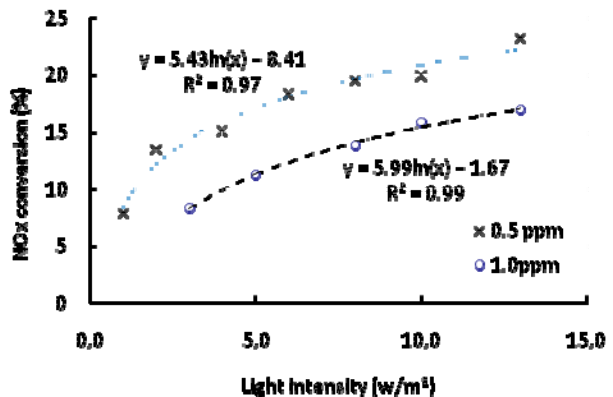


Figure 4: The influence of irradiance on PCO.

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Program/Subprogram

Intelligent Safe Secure Building/Innovation on gypsum plasterboard

Host University

Eindhoven University of Technology/Architecture, Building and Planning

Indoor air quality improvement With the application of photocatalytic oxidation

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Subject

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Goals

This research aims at applying the photocatalytic oxidation theory for the indoor air quality improvement, and the investigation of the influence of indoor air conditions on the PCO effect.

Research Question

1. How does PCO work in indoor air condition?
2. How do indoor air conditions influence the PCO effect?

Strategy

First a test set-up to apply the PCO theory under indoor air condition is developed; then a novel test sample is designed with the incorporation of the photocatalyst; and then the experiments are performed to study the PCO under different indoor air conditions; finally the analysis of the test results result in the conclusion of applying PCO for the indoor air quality improvement.

Expected Results

1. Development of the novel air purifying technology for the indoor air quality improvement;
2. Description of the influence of the indoor air conditions on the PCO effect.

Preferred Partners Applications / Sponsors

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Prime Publication / Prototyping

1. Q.L. Yu, H.J.H. Brouwers. Indoor air purification using heterogeneous photocatalytic oxidation. Part I: Experimental study. *Applied Catalysis B: Environmental*, 92 (2009) pp. 454-461, DOI: 10.1016/j.apcatb.2009.09.004.
2. Q.L. Yu, H.J.H. Brouwers, M.M. Ballari, Experimental study and modelling of the photocatalytic oxidation of NO in indoor conditions, In proceedings the 3rd international symposium on nano-technology in construction, Springer-verlag, Berlin Heidelberg, 2009, pp. 389-394.
3. Q.L. Yu, H.J.H. Brouwers, A.C.J. de Korte. Gypsum hydration: a theoretical and experimental study. In proceedings of 17th International conference in building materials (Internationale Baustofftagung), Vol. 1, pp. 783-788, Weimar, Germany: F.A. FINDER Institut für Baustoffkunde, Weimar.

Research Period

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