Catalytic Ozone Oxidation of Food Waste Odor Using Batch Reactor Comprised of Wet Plasma and Catalysts

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The control of odor has been an important topic in the area of environmental catalysis research [1, 2]. Especially, reduction of food waste odor has been a main concern of Korea government to enhance quality of life. Although the common method to reduce food waste odor is adsorption, the efficiency is low. In addition, the catalytic oxidation can proceed at lower temperatures compared with thermal oxidation alone. However; in most cases the reaction temperature is higher than 200°C. To reduce the operating temperature of odor removal below 100°C (especially at room temperature), ozone can be used. Typically ozone is added to polluted flue gas streams before they are passed through a catalyst bed.

In this work, we developed a new hybrid system comprised of wet plasma and catalyst to remove food waste odor (Fig. 1). Acetaldehyde was used as model compound of food waste odor. Ozone can be produced by wet plasma and reacted with acetaldehyde over a catalyst.

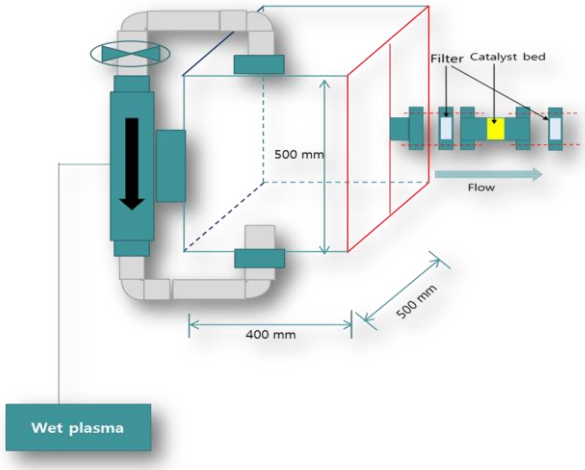

Fig. 1. Hybrid system comprised of wet plasma and catalyst.

Various kinds of transition metal added catalysts such as Mn/natural zeolites (Mn/NZ), Cu/NZ were used. The catalytic odor removal efficiency was greatly increased with ozone generated from wet plasma at room temperature.

Also, Mn/NZ showed higher removal efficiency of food waste odor than Cu/NZ (Fig. 2). The detailed reaction mechanism will be suggested.

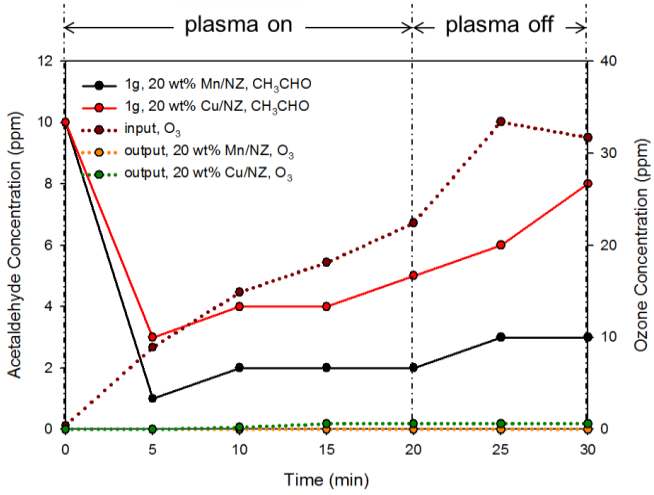

Fig. 2. Removal efficiency of acetaldehyde over Mn/NZ and Cu/NZ catalysts at room temperature

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