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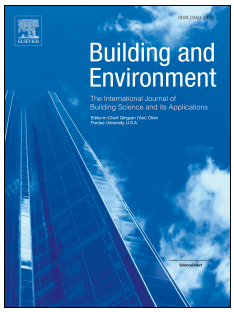

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Catalytic removal of ozone and design of an ozone converter for the bleeding air purification of aircraft cabin

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Abstract: Ozone is a major gaseous pollutant in the aircraft cabin environments. The objective of this study is to experimentally investigate the ozone removal capability of the catalyst palladium loading on the activated carbon fiber (Pd/ACFs) under various operating conditions. First, the effects of the activated carbon fibers on ozone removal are analyzed. The results show that the ozone removal over ACFs comes from the coupling effects of adsorption, chemical reaction and catalysis. The ozone conversion over the Pd/ACFs film is then confirmed to be effective when the temperature is higher than 90℃. The ozone removal rate over the Pd/ACFs exceeds 98% after accelerating test with an initial concentration of 37 ppm at temperature of 150℃ for 80 hours. The catalyst film Pd/ACFs can meet the flight requirement for 5000 hours. Based on the one-trough test results, a honeycomb reactor filled with catalyst Pd/ACFs was designed and built. The test of the reactor performance shows that the catalyst film Pd/ACFs is a good choose for the ozone removal in the bleed air of aircraft cabin. However, the pressure drop in the self-manufactured reactor is slightly high. Therefore, it is better to optimize the configuration of the ozone converter to meet the requirement of pressure drop in the future.

Keywords: Ozone；Aircraft cabin；Ozone removal；Pd/ACFs；Ozone converter

1. Introduction

Ozone is a pale blue pollutant with a uniquely pungent odor, strong oxidizing capability, and presents in a ubiquitous concentration at cruising altitudes. The ozone concentration increases as the altitude increases. Therefore it poses a potential health hazard to the passengers and crew of commercial airliners [1]. Studies have confirmed that long exposure to ozone in a concentrations higher than 0.1 ppm can cause severe health problems, such as dizziness, headache and fatigue along with various other symptoms. Exposure to a low level of ozone is also dangerous, and can

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