Development of Low-Temperature SCR Catalysts and Practical Performance Test for NOx Reduction

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Abstract

Due to the requirements and limits of NOx emissions become more stricter in Taiwan, many factories are opting to add selective catalytic reduction (SCR) equipment as their air pollution control devices. However, the most commercial available vanadium-tungsten-titanium SCR catalysts often exhibit shortcomings, such as insufficient deNOx efficiency at low flue gas temperatures and easily been poisoned and deactivated by SO2 and H2O in practical applications. Therefore, the demand for the development of efficient, economical, and durable low-temperature SCR catalysts is pressing and strong.

This study innovatively recycles silica waste to develop a new SCR catalyst suitable for deNOx at low temperatures. Its practical denitrification efficiency and anti-poisoning performance are tested in a waste incineration plant. Experimental results indicate that the new SCR catalyst, composed of a modified zeolite as the support and manganese oxide as the active metal, exhibited excellent low-temperature deNOx efficiency at 150-200oC. As the SCR catalyst is modified with iron and cerium, its deNOx efficiency and anti-poisoning performance at low temperatures are improved and surpasses the most commercial available V-W/TiO2 catalyst. The results of its practical performance test in a waste incineration plant are highly favorable, which demonstrates its significant potential for practical applications.