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### One way to improve the de-NO activity in SCR of NO with NH<sub>3</sub> over a low-rank activated coke

For the flue gas from coal-fired power plants, the usual purification process is the limestone-gypsum wet flue gas desulfurization combined with the selective catalytic reduction (SCR) denitrification by NH<sub>3</sub>. Compared with the method of series connection of individual pollutant control, simultaneous removal of multi-pollutant is prospective due to its cost-effectiveness. Activated coke can be utilized in 130-150 °C as a catalyst in catalytic reduction of NO<sub>x</sub> by NH<sub>3</sub>, simultaneously adsorbing SO<sub>2</sub> and removing multi-pollutants, such as SO<sub>3</sub>, dioxin and heavy metals. The desulfurization efficiency is usually higher than 90%, the denitrification efficiency ranges 30-50% in SCR reaction with NH<sub>3</sub>. The purpose of this study is to improve the desulfurization and denitrification performance on the activated coke through the modification and regeneration in various atmospheres and then to reveal which functional groups play a key role on SCR. We used a low rank commercial activated coke produced by Xinhua chemical plant in this work. The AC modified by H<sub>2</sub>O<sub>2</sub> and NH<sub>3</sub>•H<sub>2</sub>O can increase the content of oxygen and nitrogen functional groups on the surface of it, then increase the absorption of SO<sub>2</sub>. The denitrification activity increased 1.5-2.6 times for the activated coke modified by H<sub>2</sub>SO<sub>4</sub> than the fresh activated coke. The activated coke regenerated under NH<sub>3</sub> atmosphere significantly improves the denitrification and desulfurization activities. The denitrification efficiency increased about 10-20% for AC modified by NH<sub>3</sub>•H<sub>2</sub>O or HNO<sub>3</sub>. After modification or regeneration of activated coke, the specific surface area, the pore size distribution, the total pore volume and the types of nitrogen and oxygen functional groups were changed compared with the fresh activated coke. There is a positive relationship between nitrogen or sulfur capacity of carbonyl oxygen of quinone groups, oxygen atoms in carboxyl groups, N-6 (pyridinic) and N-5 (pyrrolic and pyridonic) in the experiment of desulfurization and denitrification of activated coke.

### Biography

Yuran Li is mainly engaged in the joint/collaborative removal of the pollutants (SO<sub>x</sub>, NO<sub>x</sub>, dioxins, dust and so on) from coal-fired flue gas/industrial furnace flue gas, activated coke/carbon desulfurization and denitrification, study of pollutant emission characteristics and evaluation standard of control equipment. She has published SCI/EI papers more than 10 articles, participated in the preparation of one monograph and applied for seven patents.

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