RESEARCH ON IMPROVING REMOVAL EFFICIENCY OF SO_2 FROM FLUE GAS IN CORONA DISCHARGE PROCESSES BY OH RADICAL

Keping Sun[1], Ming Sun[1]

[1] *Research Section of Electrostatics, Shanghai Maritime University, Shanghai, 200135, China*

Abstract. For improving the removal efficiency of SO_2 from flue gas, OH radical has been diagnosed with pipe-nozzle-plate electrode by optical emission spectroscopy in corona discharge. The results show that, in different nozzle-plate distance, the production of OH radical is affected by the nozzle-nozzle distance. Firstly, the production of OH radical is increasing as the nozzle-nozzle distance increases. When the nozzle-nozzle distance is bigger than some critical value, the production of OH radical is not changing obviously. Based on the rule, the discharge electrode for OH radical's production was designed, and applied on removing SO_2 from 65Nm^3/h simulated flue gas with unsaturated water vapor being injected into the discharge space by discharge electrode, the gas temperature from 65℃ to 80℃. The numbers of OH radical has been estimated roughly in the conditions of the experiments. The experiments show that the maximum of removal efficiency of SO_2 from flue gas is about 71%.

1. INTRODUCTION

From 1970s, the investigation on OH radical has been reported. M.B. Chang, J.H. Balbach and M.J. Rood reported removal of SO_2 from gas streams using a dielectric barrier discharge in 1997 [1]. J.J. Lowke etc. studied removal of oxides of sulphur and nitrogen in pulsed operation of electrostatic precipitators in 1995 [2]. Wu Yan etc. researched on raising the SO_2 removal efficiency with the radicals produced by H_2O in pulse discharge plasma process in 2001 [3]. They reported that the water vapor was injected into discharge space from discharge electrodes.

In this paper, we wanted to use the optical emission spectroscope to diagnose the OH radicals. We designed a new experiment system and studied the influence on the production numbers of OH radical by means of difference electrodes construction.

2. EXPERIMENTAL SETUP AND TEST METHOD

The discharge electrode's structure was shown as Fig. 1. The discharge electrode is consisted of

[1]e-mail address for correspondence author: kpsun@dbc.shmtu.edu.cn