Title: Preparation of SCR catalytic filter supported on a filter candle

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Summary

SCR catalysts have been widely developed in their forms and compositions. Among them, vanadium oxide/titanium oxide is proven catalyst and very popular owing to its high activity and the high poison resistance in sulfuric oxides and water. The advantage of the catalytic filter in the form of rigid filter elements like ceramic filter candle is enable the construction of the lower pressure drop system as well as its dual function for control the particulate and nitrous oxides simultaneously. So it meets the energy saving and a compact system to treat the effluent gases. It is reported that the SCR performance of the catalytic filter was successfully demonstrated in the pilot plants in EERC at university of North Dakota and Ohio Edisons R.E. Burger plant. Catalysts of honeycomb or plate types have advantages in their compact and successfully commercialized for gasoline engines and incinerators. However, it needs the pre-cleaning system for particulate because its particle path is too narrow to be plugged in the stream of high concentration of particulate. Otherwise, the catalytic candles meet well for the streams of high concentration of particulate. However, the potential tasks for application this in the advanced system is to increase the catalytic activity by increasing the catalyst distribution. The aim of these studies is to developed for high temperature application like the advanced coal gasification and combustion. In these cases, catalysts of very small size are supported on the pore surface of micro meters of the filter candle without any significant increase of additional pressure drop. Most lf the filter candle ate untouched by the particles are removed on the membrane surface. So the catalyst supported on the pore of supporting layer of the filter candle are untouched by the particulate. In this study, we tried to improve the dispersion of TiO_2 particle in the pore of filter candle.

Catalytic filters were prepared by deposition of TiO_2 layer on the pore surface of a ceramic filter candle (PRD-66 from AlliedSignal) by using the methods of supporting the sol-gel solutions gel in order to support the V_2O_5/TiO_2 catalyst in the pore of the dust free region of the ceramic filter. Colloidal TiO_2 particles were prepared with a sol-gel method using Tetra isopropyl ortho-titanate (TIPOT). As the model test for the catalytic activity, reduction of the pure NO in the oxygen stream was investigated. And the effect of preparation methods of the catalytic filter was discussed.

The catalytic filter prepared by applying the centrifugal force during dipping in the sol-gel solution showed the most activity. The catalytic filter prepared by applying the centrifugal force during dipping in the sol-gel solution showed the activity. The catalytic filter showed 95% conversion of 500ppm NO at the temperature range from 280 to 350°C and at the face velocity of 2cm/sec with ammonia slippage less than 10ppm, which shows a good feasibility for the commercial application of these catalytic filters.

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