

NH₃ Slip Catalyst for Clean Air Technology

Category

Cleantech

A binary catalyst that oxidizes NH₃ into either N₂ or NO and reduces the NO with NH₃ to form N₂.



Background

Selective catalytic oxidation (SCO) of NH₃ to N₂ is one of the best ways to eliminate NH₃ emissions. The major challenge in NH₃-SCO is to achieve high conversion over a wide operating temperature range, while avoiding over-oxidation to NO_x. Commercial Pt catalysts have full NH₃ conversion at low temperatures but suffer from low N₂ selectivity. Its low temperature performance needs to be improved to meet the upcoming EU7 emission standards.

Technology Overview

The researchers have designed a binary catalyst that shows better performance than the commercial ones. The Pt component is used to oxidize NH₃ into either N₂ or NO. The CuO component will then reduce the NO with NH₃ to form N₂ as the inert product. With only 0.6 wt% Pt atoms dispersed on the surface of Cu nanoparticles, simultaneously high conversion and selectivity are achieved over a wide temperature window.

The catalysts preparation is based on standard precipitation and galvanic exchange procedure, which can be easily scale up. In the next stage, the researchers will:

1. Evaluate the catalysts under realistic NH₃ slip conditions and test the on stream stability
2. Scaling up the production of the catalysts to kg level by collaborating with industrial partners

3. Deliver prototypes of catalyst bed for NH₃ emission control

See Figure 1.

Benefits

- The PtCu/Al₂O₃ catalyst can shift the NH₃ conversion by 50 K to the low temperature region
- The catalyst has >95% N₂ selectivity even at full NH₃ conversions, significantly surpass that of the commercial ones
- The catalyst only has half of the Pt content to that of the commercial ones
- The synthetic procedure is easy to scale up

Applications

- Car emission control: for vehicles that use diesel engines and SCR technologies
- NH₃ emission control in chemical industry

Opportunity

- Partners that can help with the long term stability test of the catalyst under realistic conditions
- Partners that can help in scaling up the production of the catalysts
- Partners that are potential users of the catalysts

Seeking

Development partner,

Commercial partner

IP Status

Patent application submitted

