

### Relationship between mobility and activity of Cu ion species in the Cu-SSZ-13 for selective catalytic reduction

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Cu ion exchanged SSZ-13 is a state of the art  $\text{NH}_3$ -SCR catalyst successfully commercialized in the industrial fields due to its excellent reactivity and hydrothermal stability. Recently, nature of active Cu ion has been a main topic of research to understand the Cu-SSZ-13 catalyst for the  $\text{NH}_3$ -SCR. Here, we investigate higher  $\text{NH}_3$ -SCR reactivity of 1Al-Cu species than the 2Al-Cu in the Cu-SSZ-13, which are two kinds of Cu ion species in the SSZ-13. We modified the Cu-SSZ-13 by using hydrothermal treatment to control the ratio of 1Al-Cu and 2Al-Cu. As the ratio of the 1Al-Cu which has a higher mobility than the 2Al-Cu increased, low temperature activity of catalysts enhanced under dry SCR condition, demonstrating a higher activity of the 1Al-Cu. The kinetic studies led us to reveal that the superior activity of 1Al-Cu appeared only under the reaction condition limited by diffusion of Cu ion. This result indicates that the higher low temperature activity of the catalysts was derived from higher mobility of the 1Al-Cu ion species. Such mobility-activity relationship will provide a platform to design a rational Cu-SSZ-13 catalyst by controlling the mobility of Cu ion.