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(54) Title: SYSTEMS AND METHODS FOR PROCESSING AMMONIA

(57) Abstract: The present disclosure provides methods for fabricat-
ing catalysts for ammonia decomposition. The method may comprise
(a) subjecting a catalyst support to one or more physical or chemical
processes to optimize one or more pores, morphologies, and/or surface
chemistry or property of the catalyst support; (b) depositing a composite
support material on the catalyst support, wherein the composite support
material comprises a morphology or surface chemistry or property; and
(c) depositing one or more active metals on at least one of the composite
support material and the catalyst support, wherein the one or more active
metals comprise one or more nanoparticles configured to conform to the
morphology of the composite support material and/or catalyst support
material, thereby optimizing one or more active sites on the nanoparti-
cles for ammonia processing.

**Strong Metal-Support
Interaction (SMSI)**

- ↑ Surface oxygen vacancies
- ↑ Electron donation into M-N antibonding orbital
- ↓ M-N Bond Dissociation Energy (BDE)

Ru/CeO₂-ZrO₂



Ceria-Zirconia Support

- Surface reducible CeO₂ phase
- determine optimum support (various T, calcination atmosphere, loadings)

FIG. 20

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