

論文 / 著書情報
Article / Book Information

題目(和文)	アンモニア合成及び分解における触媒担体上のルテニウムとアニオンの相互作用の役割
Title(English)	Role of Ru-anion interaction on the support surface in synthesis and decomposition of ammonia
著者(和文)	中尾琢哉
Author(English)	Takuya Nakao
出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第11448号, 授与年月日:2020年3月26日, 学位の種別:課程博士, 審査員:細野 秀雄,多田 朋史,神谷 利夫,原 亨和,北野 政明,平松 秀典,松石 聡
Citation(English)	Degree:Doctor (Engineering), Conferring organization: Tokyo Institute of Technology, Report number:甲第11448号, Conferred date:2020/3/26, Degree Type:Course doctor, Examiner:,,,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	要約
Type(English)	Outline

論文要約

論文題目 Thesis Title	Role of Ru-anion interaction on the support surface in synthesis and decomposition of ammonia (アンモニア合成及び分解における触媒担体上のルテニウムとアニオンの相互作用の役割)
----------------------	--

要約

This thesis clarifies the role of interactions of Ru and anion constituting the support at interfaces in NH₃ synthesis and decomposition by experiments and density functional theory calculations. The primary conclusions obtained are two. First, the covalent bonding between Ru and various anions (Si⁴⁻, N³⁻, O²⁻, F⁻) of the support materials works effectively to keep the Ru particle sizes to several nanometers. Second, key mechanisms of NH₃ synthesis on Ru/Ca₂NH and decomposition on Ru/C12A7:e⁻ are revealed as follows; i) anionic electrons are transferred into loaded Ru, which promotes N-N bond cleavage and formation. ii) H^{δ-} at the interface, which is more stable than on Ru surface, can prevent the hydrogen poisoning of Ru surface. iii) N-H bond formation is promoted by the reaction of H^{δ-} and N adatom at the interface.