Effect of Ru on the NOx storage and reduction performance over NSR catalyst

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Automotive industries are concerning how to reduce harmful contaminants contained in automotive exhausts such as NOx, CO and hydrocarbons. Lean-burn and diesel engines have been regarded as a promising alternative to next generation vehicle, since they emit less CO2 compared to gasoline engines. However, TWC (three-way catalyst) hardly reduces NOx emission from both engines, particularly under lean conditions. A potential way to overcome this drawback may be the development of NOx storage-reduction (NSR) catalyst, in which NOx is trapped on alkaline-earth metals under lean conditions and is reduced to N2 over noble metals under rich conditions. In the present study, the effect of Ru contained in NSR catalyst has been examined by a knowledge-based combinatorial approach using colorimetric assay. Ru-containing K based NSR catalyst shows high NOx storage capacity compared to Pt or Pd/K/Al2O3 at both low and high temperatures. In addition, the active reaction site for the high deNOx performance of Ru/K/Al2O3 has been determined by in-situ FTIR and XRD. Ru improved the oxidation activity of NO to NO2 and Ru oxide formed on the catalyst surface plays an important role for NSR reaction.