Nanocomposites and nanomaterials

Influence of support on catalytic properties of supported platinum nanoparticles in water gas shift reaction

Z.V. Kaidanovych, Ye.Yu. Kalishyn, P.E. Stryzhak

L.V. Pysarzhevsky Institute of the Physical Chemistry of the National Academy of Sciences of Ukraine. Prospect Nauki, 31, Kiev-03028, Ukraine.
E-mail: z.kaidanovych@gmail.com

Water gas shift (WGS) reaction is used for production the hydrogen from synthesis gas, which is further used for a wide variety of industrially important processes. The technology of this process includes two steps: middle-temperature stage with using Fe-containing catalysts and low-temperature stage with using Cu-containing catalysts. This process could be optimize by using catalysts, which contain noble metals. It is catalytically active and thermally stable in wide range of temperatures.

In order to compare catalytic activity of platinum nanoparticles supported on different carbon materials, colloidal solution of platinum nanoparticles were synthesized with further supporting on activated carbon and carbon nanoparticles (CNT). Supports and obtained catalysts with platinum nanoparticles were tested in water gas shift reaction. Fig.1. shows the dependence of reaction rate of Pt/C catalysts from temperature.

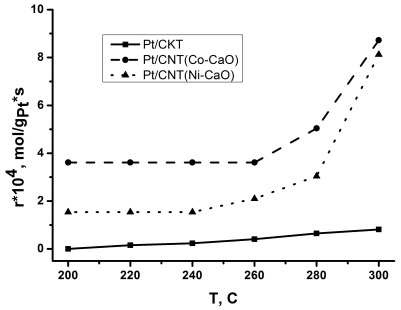

Fig.1. Dependence of reaction rate of Pt/C catalysts from temperature.

Activated carbon shows no activity in WGS reaction. Catalyst with Pt nanoparticles supported on activated carbon shows the same activity as pure carbon nanotubes. The highest catalytic activity have Pt/CNT. It could be explained by higher thermal stability of platinum nanoparticles supported on CNTs and higher

adsorption properties.