Zbigniew Grzesik, J Pet Environ Biotechnol 2014, 5:4
http://dx.doi.org/10.4172/2157-7463.S1.008

OMICS Group Conferences
Accelerating Scientific Discovery

2nd World Congress on
Petrochemistry and Chemical Engineering
October 27-29, 2014 Embassy Suites Las Vegas, USA

Corrosion behavior of valve steels in combustion gases of biofuels in car engines

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The corrosion behavior of several steels, actually utilized for production of valves in car engines has been studied under thermal shock conditions in combustion gases of diesel oil and petrol, containing different concentrations of bio-components. These experiments have been carried out by rapid heating of the studied materials up to 1173 K and after two hours heating, cooling down to room temperature. It has been found that the addition of bio-components to the fuels decreases the corrosion resistance of all steels under investigation, this effect being the stronger, the higher was the concentration of bio-component addition. It has been also shown that in spite of bio-component addition, the X33CrNiMn23-8 steel containing the highest chromium concentration, behaved much better than all other remaining steels due to the formation of the highly protective chromia scale, well adherent to the surface of this steel. Because of fundamental importance of this problem, systematic investigations have been undertook in order to minimize the corrosion of valve steels. As a results, it has been found that improvement of corrosion resistance of valve steels can be obtained by increasing the chromium concentration in these materials and by addition of rare earth elements. However, the most promising effect should be obtained utilizing new generation of high temperature coatings in order to reduce the corrosion attack of combustion gases in car engines.

Biography

Zbigniew Grzesik has completed his PhD from AGH University of Science and Technology (Krakow, Poland) in 1983. He is active in science and education in the Faculty of Materials Science and Ceramics at the AGH University of Science and Technology. His scientific work is concentrated on solid state chemistry and in particular, on the mechanisms of high temperature corrosion of metalic materials in various aggressive environments as well as on kinetics and thermodynamics of point defects in transition metal oxides and sulphides.

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