

Catalytic Effect of Graphene Oxide on the Oxidation of Paraffin-Based Fuels

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Abstract : Paraffin-based fuels are regarded to be a promising fuel of hybrid rocket motor because of the high regression rate, low price, and environmental friendliness. Graphene Oxide (GO) is an attractive energetic material which is expected to be widely used in propellants, explosives, and some high energy fuels. Paraffin-based fuels with paraffin and GO as raw materials were prepared, and the oxidation process of the samples was investigated by thermogravimetric analysis differential scanning calorimetry (TG/DSC) under oxygen (O_2) and nitrous oxide (N_2O) atmospheres. The oxidation reaction kinetics of the fuels was estimated through the non-isothermal measurements and model-free isoconversional methods based on the experimental results of TGA. The results show that paraffin-based fuels are easier oxidized under O_2 rather than N_2O with atmospheres due to the lower activation energy; GO plays a catalytic role for the oxidation of paraffin-based fuels under the both atmospheres, and the activation energy of the oxidation process decreases with the increase of GO; catalytic effect of GO on the oxidation of paraffin-based fuels are more obvious under O_2 atmospheres than under N_2O atmospheres.

Keywords : graphene oxide, paraffin-based fuels, oxidation, activation energy, TGA

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