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Catalytic Decomposition of High Energy Materials Using Nanoparticles of Copper Chromite

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Abstract : Chromites are binary transition metal oxides with a general formula of ACr_2O_4, where A = Mn^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+}, and Cu^{2+}. Chromites have a normal-type spinel structure with interesting applications in the areas of applied physics, material sciences, and geophysics. They have attracted great consideration because of their unique physicochemical properties and tremendous technological applications in nanodevices, sensor elements, and high-temperature ceramics with useful optical properties. Copper chromite is one of the most efficient spinel oxides, having pronounced commercial application as a catalyst in various chemical reactions like oxidation, hydrogenation, alkylation, dehydrogenation, decomposition of organic compounds, and hydrogen production. Apart from its usage in chemical industries, $CuCr_2O_4$ finds its major application as a burn rate modifier in solid propellant processing for space launch vehicles globally. Herein we synthesized the nanoparticles of copper chromite using the co-precipitation method. The synthesized nanoparticles were characterized by XRD, TEM, SEM, BET, and TG-DTA. The synthesized nanoparticles of copper chromites were used as a catalyst for the thermal decomposition of various high-energy materials.

Keywords : copper chromite, coprecipitation method, high energy materials, catalytic thermal decomposition
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