Solid Propellant Burn Rate Sensitization Using a Nano-titania Additive

Advantages
• Significantly increases a propellant’s burn rate by 10 times or more
• Additive is inexpensive and easy to produce

Invention
The composition and method of manufacturing a solid composite propellant additive containing Titanium oxide nanoparticles that increase burn rate

Background
Additives (such as burn-rate modifiers, curing agents and plasticizers) are commonly employed in many rocket propellants and explosives. The current invention is a nanoparticle additive which acts as a catalyst to solid propellant fuel, enhancing burn rates of the fuel by up to ten times or more over a varying range of pressure indices. Titanium oxide (TiO2) nanoparticles are mixed with a solid propellant fuel, where the nanoparticles are approximately 2% or less of the total propellant mixture. The high surface-to-volume ratio of the TiO2 nanoparticles improves the performance of the solid propellant fuel by providing ample amounts of oxygen to replace that utilized by the combustion.

Application
The invention increases the burn rate and performance of solid rocket propellants. Various military and aerospace applications could utilize the invention in order to increase the power-per-unit volume (energy density) produced by their current solid propellants.

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Selected References