

Control of burn rate of AP-based metal rich solid propellant through the application of an electric voltage

Guides: Prof. P.A Ramakrishna and Dr. Joel George M

Motivation

Solid rocket motors are not throttleable, despite numerous attempts to develop methods for controlled thrust. One novel approach involves applying a DC electric voltage directly to solid propellant, a concept that has yet to be explored in existing literature

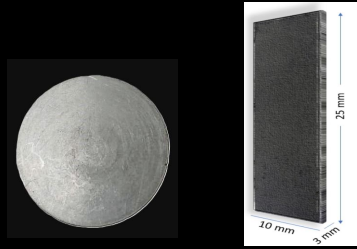
Conclusion

Experimental data reveals an 18% increase in burn rate when a 15V DC voltage is applied. This increase cannot be attributed solely to heating effects; rather, the application of electric voltage alone is responsible for the observed 18% enhancement in burn rate.

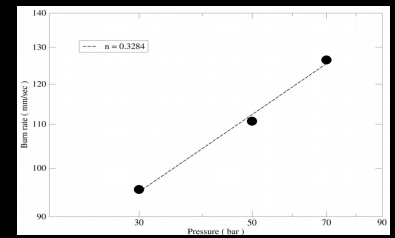
Publication: G. Piyali and P. A. Ramakrishna, Effects of DC Electric Voltage on Solid Propellant Burn Rate (2023), 13th International Symposium on Special Topics in Chemical Propulsion and Energetic Materials, page- 82, Gjøvik, Norway, June, 2023

Highlights

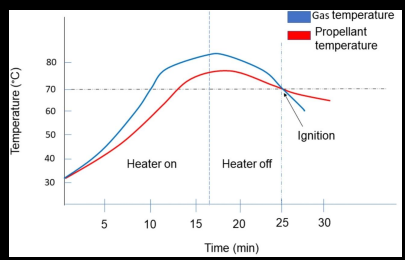
Developed an AP-Al based pressed propellant with good thermal conductivity and electrical sensitivity



Performed experiments in Crawford bomb to understand combustion characteristics under high pressure



Experiments done in Crawford bomb to calculate the temperature sensitivity of the propellant (0.243%)



Experiments done by applying electric voltage on the propellant to see changes in burn rate

