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A SOLID STATE THRUSTER FOR ATTITUDE CONTROL OF PICOSATELLITES

Abstract

Through an increasing number of successful missions, picosatellites are shown to be a viable method for cost-effective space research. Attitude control, being critical for some satellites, is an area of active research. Traditional thruster designs not scaling favorably, a novel thruster for attitude control is presented. An array of solid sodium azide cells has been fabricated which, when heated, produces nitrogen gas. This gas is utilized for thrust. Each cell is one-shot, but by making the cells small enough an almost continuum of impulse can be realized. Theoretically, the chip produces 2.7mL of gas at STP per chip 1cm x 1cm x 600μm (not including control electronics). This corresponds to 5μN-s impulse bit and 35mN-s per 1cm x 1cm square. Propellant deposition into microscale arrays and subsequent decomposition have been tested but not yet integrated with an addressable heater array.