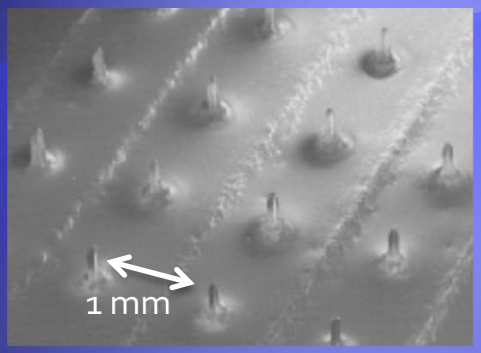
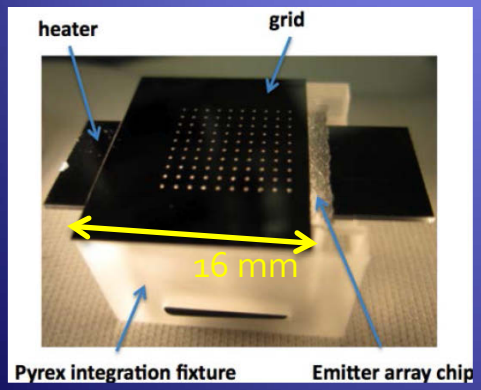
Microfabricated Electrospray Propulsion

- Thrust range microNewtons-milliNewtons
- Compact, low mass and highly scalable architecture with microfabricated components



Microfabricated emitter array



Microfabricated thruster (<10 grams)

100 uN Thrusters	2 Thruster System (1 operating + 1 redundant)	8 Thruster System (2 operating + 5 on standby + 1 redundant)
Thruster, Neutralizer, PPU Dry Mass (g)	100 g	200 g
Propellant mass (g) for 1000 m/s of delta-V for 3 kg Cubesat**		
Indium (6000 s Isp, 7.03 g/cm^3 density)	51 g (7 cm3)	
Ionic Propellant (240 s Isp, 1.52 g/cm^3)	1022 g (646 cm3)	
Beam, Heater and Neutralizer Power (W)*		
Indium	5 W	20 W
Ionic Propellant	< 1 W	< 1 W
Volume (cm^3) - without propellant	40 cm^3	100 cm^3

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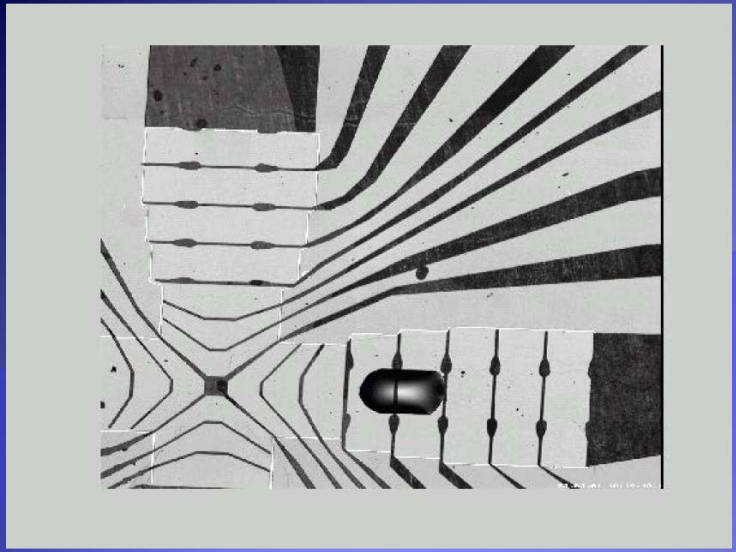
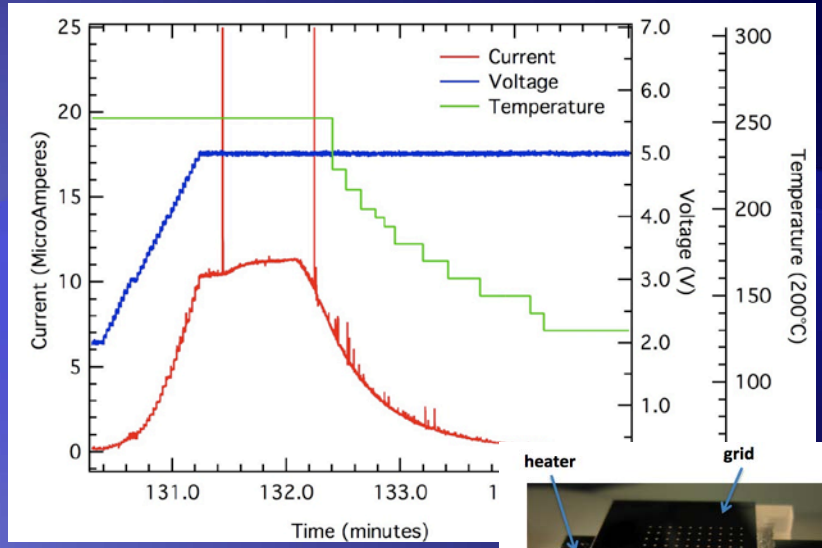
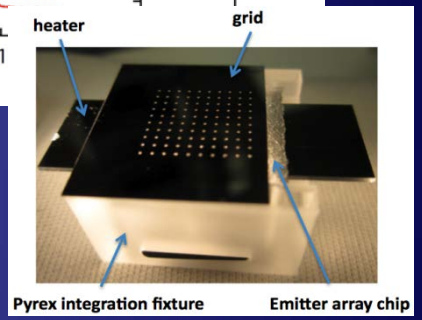
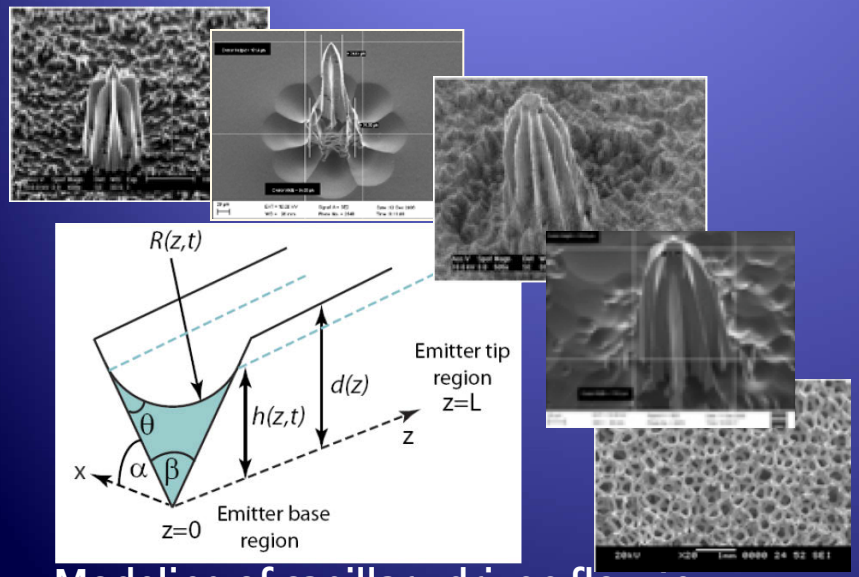


Thermocapillary actuation of drop (1 mm) has been demonstrated





Thruster prototype has been demonstrated



Modeling of capillary driven flow in grooves and pores is underway

Remaining Challenges:

Feed system model and design development

- Tip shape design
- Emitter groove geometry design
- Chip surface morphology design
- Propellant distributor design
- Propellant reservoir design