Advanced Colloids Experiment with Temperature Control (ACE-T)

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Customers/Adopters (Push): FP1, AP5

Objective/Experimental Approach:

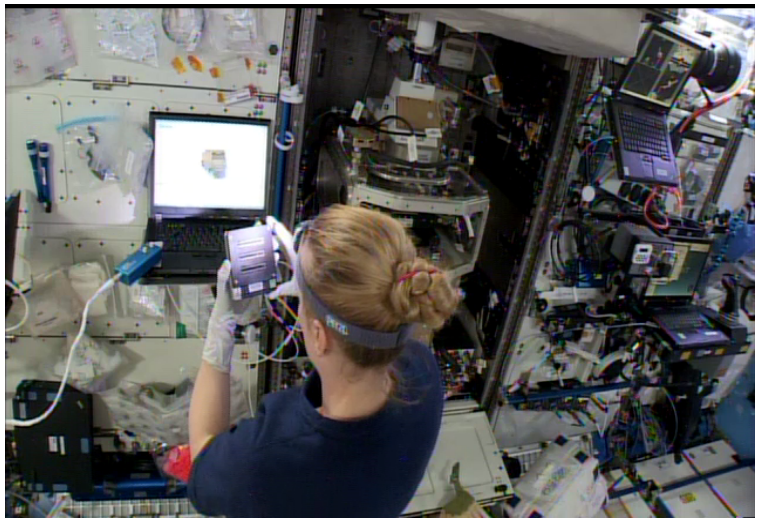
- Observe colloidal self-assembly in 3-D for a variety of shapes, sizes, and particle interactions. This will enable us to learn how to control numerous processes.
- Conduct a series of applied investigations with commercial impact.
- Pioneer scientific advances that build understanding and drive colloidal engineering.

Relevance / Impact:

- Understanding phase separation without the effects of gravity reveals how to extend product shelf-life. This is a multi-billion $concern for P&G. (Lynch, P&G Principal Scientist, works directly with NASA through CASIS. 3 patents allowed.
- Studying phase separation near a critical point. A model for system important to many industrial process, such as, extraction of chemicals like caffeine (Weitz)
- Learn to build 3-D structures with lock-and-key self-replicating non-biological systems from nanoscale building blocks. (Chaikin)
- Ascertain the importance of polydispersity in controlling colloidal crystallization, important for manufacturing. (Yodh)
- Study Complex Fluids via 2013 (NASA) NRA selections, EPSCoR AO, 2 ISS ESA international partners, and S. Korea (NASA HQ 2009 MOA).

Project Development Approach:

- Utilize confocal capabilities. Develop a common ACE-T module and electronics base for a set of investigator requirements with a Contractor team.



Kate Rubins installing ACE-T sample module on ISS

ISS Resource Requirements

Accommodation (carrier)	Light Microscopy Module
Upmass (kg) (w/o packing factor)	3.5 kg/ACE-T base 1.0 kg per ACE-T module
Volume (m^3) (w/o packing factor)	0.001 m^3 ACE T Base 0.00001 m^3 sample module
Power (kw) (peak)	0.012kw ACE-T, 1.1 kw FIR/LMM
Crew Time (hrs) (installation/operations)	2.5 - 3.5 per installation
Autonomous Operation	144-640 est. depends on experiment
Launch/Increment	SpaceX-10-20/ Increment 50-62

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