

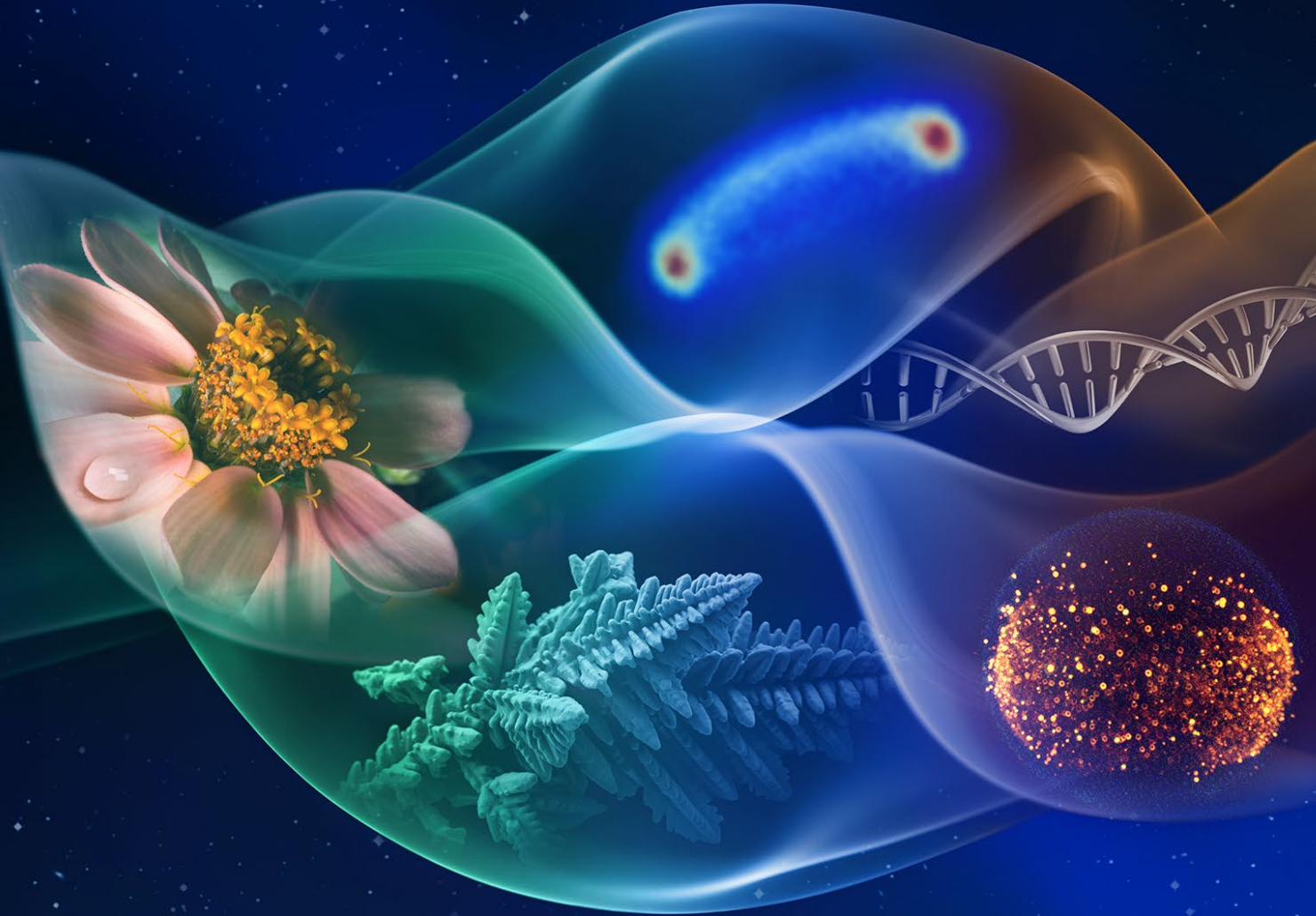


BPS

BIOLOGICAL AND
PHYSICAL SCIENCES

Progress Toward KSQs for Physical Sciences

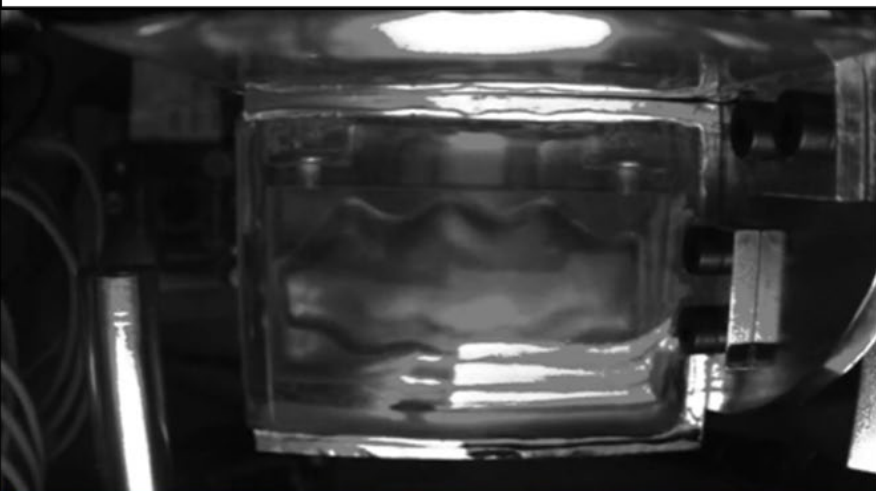
NASA MSFC EM31
Brandon Phillips



How are we leveraging our Materials Science to support Engineering and Exploration Applications?



MSFC Hosts both Aqueous Solutions Levitator Techniques (Electrostatic and Acoustic)

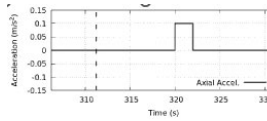


A container holding two fluids is shaken vertically on the ISS to study the Faraday wave patterns that form at the interface between the fluids.

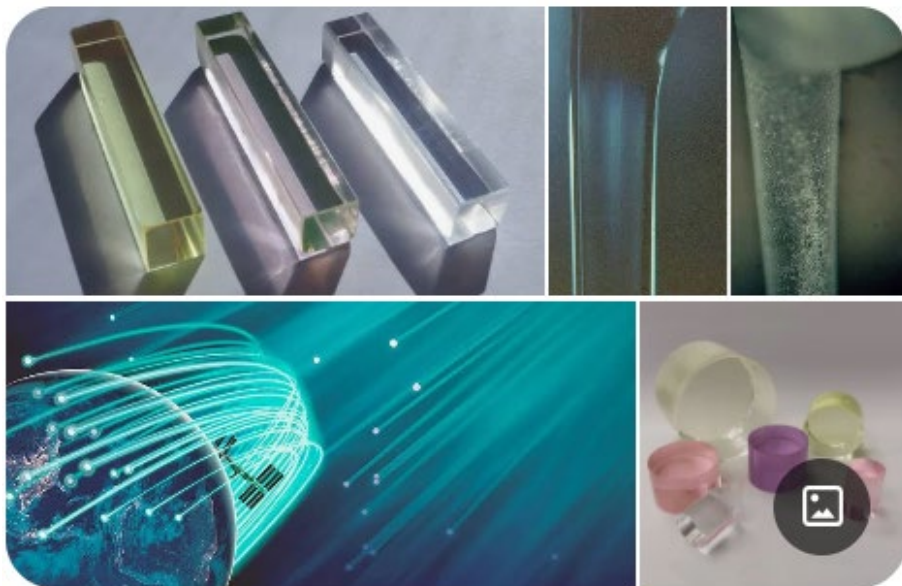
Credit: University of Florida

The Fluid Dynamics Branch (ER42) has benefited from the ISS data and videos provided by Dr. Narayanan and from dialogue about the onset of Faraday waves. Engineering models have been developed to guide designers in developing pulsed settling operations in space. Further validation of our computational fluid dynamics (CFD) models in microgravity could be performed with the data acquired by Dr. Narayanan and the UF team.

Used to improve container-less processing studies of protein crystal growth for biofilms and pharma studies with potential technology development for surface tension between interfaces for High/Low Intensity Focused Ultrasound for applications in both detecting and treating cancer cells.



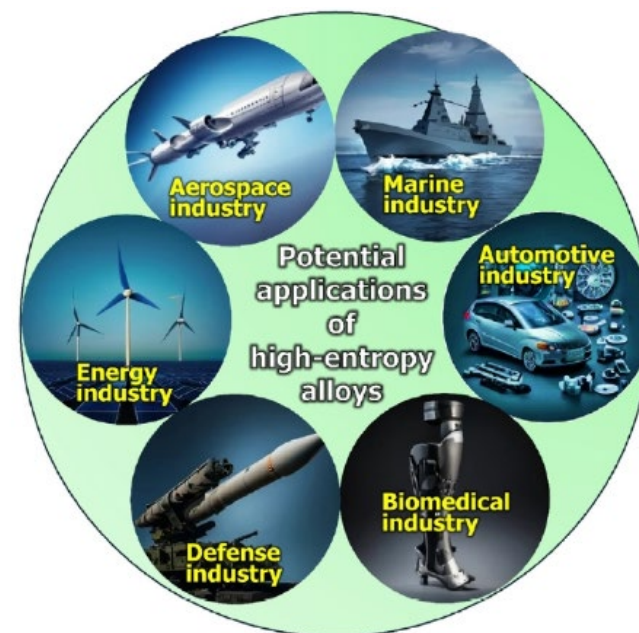
Time: 311.24994



Dr. Hyers (WPI) and Dr. Weber (MDI) both are working optical material development that would improve space-based laser systems for performance in ISM, power beaming, communications, and DOD interests.

Other lead researchers, like Dr. Cozmata, are supporting fiber pulling in microgravity, which may be one of the lead candidate product markets for LEO and CLD as first benchmark commercial products.

Dr. Hyers and Dr. Matson are both working to develop material properties for High Entropy Alloys that will have direct and enabling applications for Hypersonic Research and Tech Development and citing evidence shows, both domestic and global researchers are actively watching for publications from our funded PIs and using said work to justify further studies on similar materials of interest. The Materials Levitation Lab is leaning more into supporting Refractory HEAs to support Hypersonics and SNP/NTP applications, along with the ISRU technology maturation.



Finally, we've been interested in developing a hybrid arrayed system for pre-sorting and extracting ISRU regolith materials for both passive characterization and improving of downstream processing using other In Space Manufacturing (ISM) technologies. We have been circulating this concept with some Planetary Science folks along with our counterparts at GRC Soft Matter Labs. This technology could prove to be a vital enabling Game Changing Development that would allow for breaking the bottleneck issues limiting ISM tech in their current states.

We have been actively seeking cost sharing within our other SMD and STMD engagements to allow for the maturation and bench top demonstration of the technique so that we can further evaluate.