With More Than 100 Space-Grown Crystals In Hand, NanoRacks LLC Seeks Partners To Bring Higher Quality Protein Structures To Biomedical Research

Houston, Texas, June 6, 2013– NanoRacks, LLC announced today positive test results on the ability to grow protein crystals in space using research hardware commonly used by biotechnology companies. The experiment was recently conducted aboard the International Space Station (ISS) by Canadian astronaut Chris Hadfield and the resulting protein crystals were returned from space with crystals intact for scientific examination. This proof of concept study demonstrates that a much larger number of X-ray crystallization experiments are now accessible to scientists in space, providing better structural models of disease-causing proteins. NanoRacks' innovative hardware and their commitment to collaboration has allowed scientists to rethink the way scientific experimentation is done in space.

"We have great crystals," said Principal Investigator Carl Carruthers, Jr. of The Methodist Hospital Research Institute. "The novel use of an industry standard research method worked perfectly."

"Today, with advances in technology, innovations being realized on the ground can now extend to space," explained Carruthers.

Until now, researchers relied on custom built hardware for growing protein crystals in space under what is called a "microgravity" environment because the force of gravity is many times smaller in orbit. The NanoRacks team worked with Emerald Bio, a leading biopharma firm in Boston and Seattle, to implement their standard hardware for microgravity protein crystal growth. Using this technology allows researchers to use far less of their valuable protein sample in hundreds of different experimental conditions at costs far below anything previously possible in microgravity research. "Within a couple of missions," explains NanoRacks CTO Michael Johnson, "we will have tested more proteins than all previous microgravity missions combined."

Equally exciting, "one of the proteins that grew on the space station was a therapeutic target for controlling metabolism and diabetes. These initial results are very encouraging," adds Carruthers.

"The positive results we are announcing today kick starts a whole new chapter," said NanoRacks CEO Jeffrey Manber, whose company funded the pilot project. "This creates a new pathway for the biopharma research industry. Each new protein structure discovery could mean new potential treatments for cancer, diabetes, Alzheimer's or multiple sclerosis."

While there has been success in growing better protein crystals in microgravity before, the pace of further discoveries has been encumbered by limited access, the requirement of a large protein sample volume, and flying only a few experimental variables. NanoRacks works with its partners to utilize the most recent terrestrial research procedures and hardware, combining the newest technologies with the long microgravity growth time possible on the ISS. These initial results suggest a new pathway in the utilization of microgravity for medical and drug research is now possible.

Why Grow Protein Crystals in Microgravity?

Proteins are fundamental components of all living creatures. In order to fully understand the function of a protein, researchers seek to determine its three-dimensional structure. While the human genome codes for ~30,000 proteins, the structure of most, and consequently a deeper understanding of their mechanisms, is unknown. Knowledge of protein structure also allows industry and academic researchers to develop novel pharmaceuticals that can activate or inhibit their function, therefore allowing regulation of critical disease pathways. One method to determine a protein's three-dimensional structure is by growing a protein crystal and then analyzing the crystal with X-rays. The better quality the crystals, the more precisely the structure can be determined. Protein crystals grow better in space due to the fact that thermal convection and sedimentation, two solution properties caused by gravity on earth, are virtually nonexistent in orbiting vessels such as the ISS.

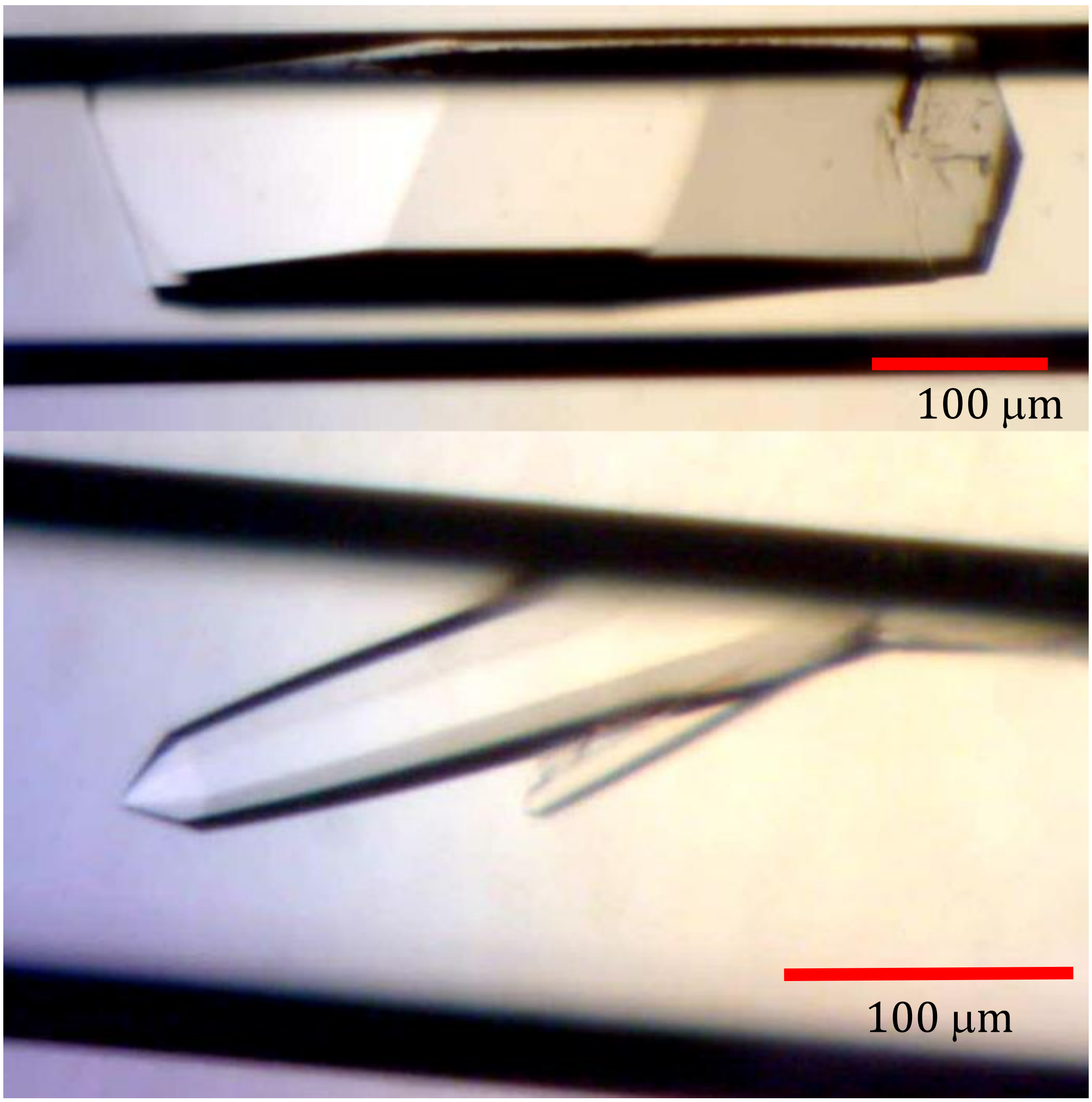
Protein crystals grown in microgravity have been shown to further biomedical research with higher resolution protein structures[1], but not yet on a commercial scale. NanoRacks is seeking collaborations with biotechnology and pharmaceutical companies, enabling them to gain access to more high quality models of drug discovery targets. For the first time, scientists can take full advantage of state-of-the-art biomedical research technologies in space using NanoRacks' flexible hardware and collaborative business model. The next space station flight opportunity for the protein crystal growth system is scheduled for early 2014.

About NanoRacks

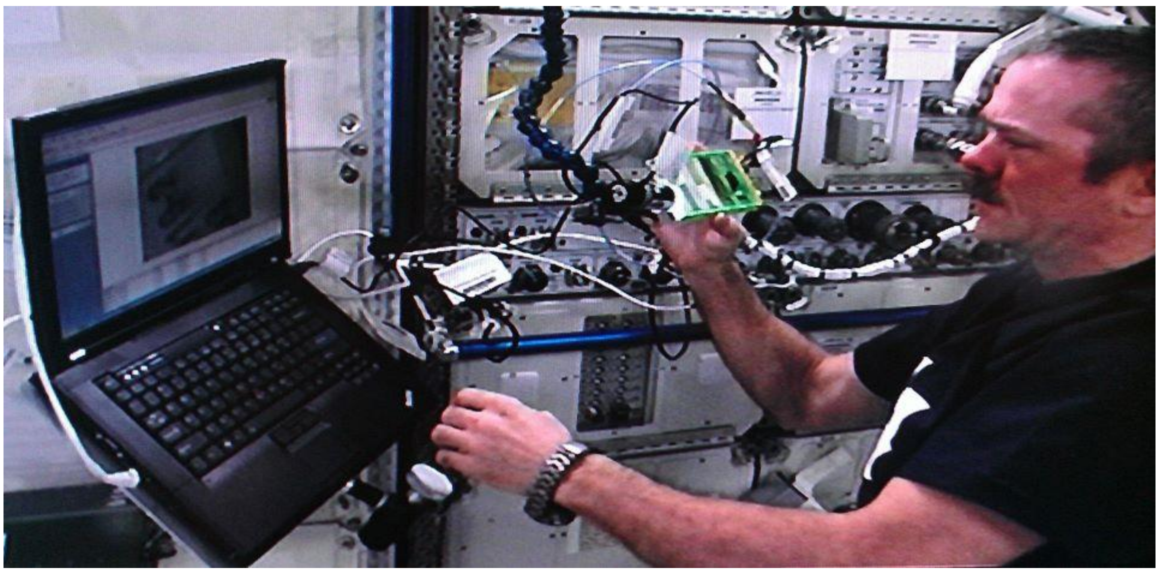
NanoRacks LLC was formed in 2009 to provide quality hardware and services for the U.S. National Laboratory onboard the International Space Station. The company developed and has research platforms onboard the U.S. National Laboratory, which can house plug and play payloads and a family of other research facilities. The current signed customer pipeline of over 60 payloads includes domestic and international educational institutions, research organizations and government organizations, and has propelled NanoRacks into a leadership position in the emerging commercial market for low earth orbit space utilization and beyond. For more information, visit http://nanoracks.com/.

Reference

1. Takahashi, S. *et al.* High-quality crystals of human haematopoietic prostaglandin D synthase with novel inhibitors. *Acta Crystallograph. Sect. F Struct. Biol. Cryst. Commun.* **66,** 846–850 (2010).



Two examples of protein crystals from this experiment that were grown in microgravity: Lysozyme (top) is ~450 x 150μm long. Xylanase (bottom) is ~250 x 50μm.



Canadian Astronaut Chris Hadfield performs a microscope survey of NanoRacks' microgravity protein crystal growth samples while aboard the International Space Station.

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