NASA SBIR 2011 Phase I Solicitation

X15.02 Advanced Food Technologies

Lead Center: JSC

Participating Center(s): JSC

The purpose of the NASA Advanced Food Technology Project is to develop, evaluate and deliver food technologies for human centered spacecraft that will support crews on long duration missions beyond low-Earth orbit. Safe, nutritious, acceptable, and varied shelf-stable foods with a shelf life of 3 - 5 years will be required to support the crew during these exploration missions. Concurrently, the food system must efficiently balance appropriate vehicle resources such as mass, volume, water, air, waste, power, and crew time.

Refrigeration and freezing require dispensable resource utilization, so NASA provisions consist solely of shelf stable foods. Stability is achieved by thermal or irradiative processing to kill the microorganisms in the food or drying to prevent viability of the microorganisms. These methods do impact the micronutrients within the food substrate. Environmental factors (such as moisture ingress and oxidation) are also capable of compromising the nutrient content over the shelf life of the food. Since the food system is the designated source of nutrition to the crew, a significant loss in nutrient availability could significantly jeopardize the health and performance of the crew. Optimal nutritional content of the food for up to five years will ensure that the food can support crew performance and help protect their bodies from deficiencies that cause disease.

Vitamin content in NASA foods, such as Vitamin C, Vitamin A, thiamin, and folic acid, is degraded during processing and as the product ages in storage. The goal is to develop a system that protects the vitamins from this degradation at ambient temperatures over a five year duration. Possible technologies that could be investigated to protect food ingredients from biological and chemical degradation of components over time include nanoscale technologies (e.g., encapsulation), biosensors, novel food ingredients, and controlled-release systems. Technologies or systems that could aid in increasing the bioavailability of the nutrients should also be considered.

Phase I Requirements: Phase I should concentrate on the scientific, technical, and commercial merit and feasibility of the proposed innovation resulting in a feasibility report and concept, complete with analyses.

NASA Deliverable: A system which will result in higher nutrient content in shelf stable foods.