Paper ID: 91408
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IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
In-Space Manufacturing and Production Applications (8)

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DEVELOPMENT OF IN SPACE MANUFACTURING CAPABILITIES FOR THE PRODUCTION OF PROTEIN-BASED ARTIFICIAL RETINAS

Abstract

Utilization of the capabilities of the International Space Station (ISS) and private partners to stimulate demand and catalyze markets leading to broad low earth orbit (LEO) based commercial opportunities is of high importance and is driving research and development of terrestrial-based applications that can benefit from a microgravity environment. LambdaVision's protein-based artificial retina is one example of a promising drug product that may benefit from production in LEO. Through efforts by the company and its implementation partner, Space Tango, nine research flights to the ISS have demonstrated the potential for producing LambdaVision's protein-based artificial retinas in a microgravity environment using Space Tango's CubeLab systems. These missions have advanced the hardware, fluidics, operational controls, and in-process quality measurements to generate multiple artificial retina thin films on the ISS. Additionally, the artificial retina technology developed by LambdaVision offers a unique test case for developing a minimum viable product in microgravity using the International Space Station as a testbed, with the eventual transition to pilot scale and steady-state production on a Commercial LEO Destination (CLD). In addition to the applications generated by LambdaVision and the research group of Dr. Robert Birge, the layer-by-layer manufacturing method used to generate the artificial retina has important commercial potential for other biomedical applications. On a larger scale, LambdaVision's commercial efforts in microgravity will demonstrate that it is feasible to manufacture a drug or therapy using a LEO platform, and this achievement will continue to inspire new research and commercial product development that can foster a thriving LEO economy.