

# VIEW FROM THE CUPOLA

By Cady Coleman | Retired NASA Astronaut



*Cady Coleman (Colonel (Ret) USAF), is a former NASA astronaut, a scientist, and the author of the book “Sharing Space.” She flew on two space shuttle missions and spent almost six months living and working on the ISS.*

**In 2010, the day after my 50th birthday, I got the best present imaginable. I climbed aboard a Russian Soyuz rocket with my two crewmates and launched to the International Space Station (ISS). As a scientist-astronaut, it was the fulfillment of a long-held dream to live for almost six months on the ISS, where every day I worked with scientists on the ground to conduct unique experiments not possible on Earth.**

As we celebrate a quarter century of continuous human presence on the ISS, I'm inspired to reflect on how we got here and the enormous impact our scientific and engineering research in space has made. I'm honored to contribute to this 10th anniversary issue of the ISS National Lab's *Upward* magazine, a marvelous place to learn about those stories of discovery.

On my first space shuttle flight, our goal was to help ensure we were designing the ISS to operate successfully as a space laboratory. Routine operations on the space station today were big questions back then. How will scientists on the ground interface with astronauts? How and when will the scientists receive their data? What kind of equipment is needed to conduct state-of-the-art research in many disciplines? However, my biggest question at the end of our 16-day mission—the longest shuttle mission at that time—was: “Why are we coming home? We have so much work to do up here!”

Our scientific journey in space has greatly evolved since then. The orbiting laboratory has been the site of amazing discoveries, with each experiment and each set of results building on the ones that came before. In many realms,

from combustion to biology, ISS science has deepened our understanding of fundamental processes, giving us the building blocks to produce new materials, design new drugs and medical devices, and expand options for growing food, even in inhospitable environments.

As astronauts, we serve as the scientists' partners in space, always aware that our efforts are part of a broader mission of discovery. It is a privilege to be part of a family that includes not only our astronaut crewmates but the engineers and scientists who design the experiments we conduct. The family also includes the people who tell the stories of those discoveries, which is so important to sustaining the work we do and inspiring others to join our efforts. As you read the three features in this issue highlighting remarkable innovations from ISS National Lab-sponsored research, imagine all the people and work that led us here.

This issue's cover story showcases LambdaVision's research on manufacturing artificial retinas for those blinded by retinitis pigmentosa and age-related macular degeneration. In collaboration with the ISS National Lab, NASA, and Space Tango, LambdaVision has successfully produced several high-quality artificial retinas on the ISS. Microgravity



facilitates the production of these highly uniform, 200-layer protein-based thin films without the sedimentation issues that limit manufacturing on Earth. Now the startup is working to refine processes and lay the groundwork for scalable in-space production and future clinical trials.

As the second astronaut ever to capture a free-flying object from the ISS using the CANADARM2 robotic arm, I was intrigued by this issue's feature on Kall Morris Inc. (KMI). The startup is advancing technology that could help with space debris removal, a difficult and growing challenge. KMI leveraged the ISS National Lab to successfully test its REACCH (Responsive Engaging Arms for Captive Care and Handling) system. REACCH unfurls its tentacle-like arms to capture free-floating objects, gripping them with technology that mimics the way a gecko's feet enable it to walk up walls. After further refinement, REACCH will progress to capturing space objects in low Earth orbit (LEO).

Given my early materials work as a polymer chemist, I'm particularly excited about the feature on the U.S. Naval Research Laboratory's investigation into microbes that produce melanin, a natural pigment. Among other fascinating properties, melanin is known to protect cells against radiation

and oxidative stress and can also bind to environmental toxins, properties that matter both to astronauts in space and those of us here on the ground. Studying melanized microbes in microgravity could generate valuable insights into how these organisms produce protective compounds, informing the development of advanced biomaterials and potentially new therapeutics.

As an astronaut, there is no greater satisfaction than being part of an experiment that leads to a leap forward in our understanding. Looking back at the full scope of what has been accomplished on the ISS and the thousands of people responsible for its success, I know that satisfaction is shared widely. Our cumulative experience operating an international scientific outpost in space has built invaluable capabilities, infrastructure, and collaborative models—both scientific and international—that will be pivotal as we continue to explore in LEO and beyond. This milestone and the legacy of our space station aren't endpoints; they are bridges to an exciting future. ■