Mission (soon to be) accomplished

NovaCentrix is not only an innovation leader in photonic curing technology, the company's conductive inks have now even made it into space

The rapidly expanding wearables market is the ideal venue for showcasing the advantages of printed electronics. Bringing value through seamless integration of electronics with the format of wearable devices, printed electronics are now widely used to track the movements of athletes – leading to safer and improved performance, to monitor the health and well-being of infants and the elderly, and to aid first responders in the field.

One extraordinary application for printed electronics could be in the field of space exploration. But there are inherent challenges. The inhospitable conditions of space exploration – and the impact of those conditions on the material properties of fabrics and conductive inks – need to be well-studied and tested before conductive inks in space become a near-future reality.

Pablo de León testing out the NDX-1 spacesuit in Antarctica (photo: Pablo de León)

Experiments in space

The Materials International Space Station Experiment (MISSE)-11 mission is providing a way for these studies to happen. Recently, NASA selected five technologies to be part of MISSE-11, one of them being the Electrodynamic Dust Shield (EDS) experiment. As part of the EDS experiment, an innovative dust-mitigation technology was developed by Prof Pablo de León, and Dr Kavya Manyapu, both of the University of North Dakota's space studies programme.

"Due to the short time we had to test and fly this payload, we reached out to private industry and found Austin, Texas, based NovaCentrix – manufacturers of high-quality conductive inks and printed electronics," de León said. "They were able to help us print the screen we needed into the spacesuit fabric and deliver it in time to the Kennedy Space Center."

Spacesuit fabric

The technology revolves around directly depositing an interdigitated pattern on a specialised fabric. The fabric itself is part of the NDX-1 spacesuit designed in Prof de León's laboratory. The interdigitated pattern was screen printed at NovaCentrix' facilities in Austin, Texas, where Dr Rudy Ghosh, academic liaison at NovaCentrix, led the screen printing activities for the project. Dr Ghosh shared: "At NovaCentrix, we are driven by innovation that directly assists our customers and technology partners, and we continuously strive to make the printed electronics ecosystem larger and more productive."

The choice of printing technique, conductive ink used, and post processing of materials was dictated by the exacting demands of a space environment; the harshness of which means high rates of erosion, specifically of polymeric materials, an important component of most off-the-shelf conductive inks. According to Prof de León, "since it will be exposed to space for one year, we need to be sure it will not delaminate, so upon return, we can test it and see if the dust-repealing capabilities stay the same. This technology will be vital during lunar and Mars exploration."