



Additive
manufacturing

Sustainable
manufacturing

Advanced
polymer
products

Innovation

Nano
manufacturing

Collaboration

Industry
focus

Project Summary

June 2022

NW**CAM**

North West Centre for Advanced Manufacturing

Nuprint Technologies Limited



Company overview

Nuprint, established in Derry~Londonderry over 30 years ago, is a specialist in the manufacture of high-quality commercial and industrial labels. With clients across Europe and the world, Nuprint works with local and global brands to provide bespoke high-quality labelling solutions. Having invested in state-of-the-art printing equipment and technology, Nuprint's team is skilled in the production of high-quality labels which can be customised in a variety of ways (including hot/cold foil, embossing, lamination, interactive print, silk screen, and shrink sleeves). During the COVID-19 pandemic Nuprint diversified into the life and health sciences sector and created a new company, NorthWest Medical Limited, which manufactures and supplies medical and PPE equipment.

The projects

- Printing of electronic layers and devices on flexible substrates
- Smart printed RFID sensor tags for health monitoring

Industry focus

Nuprint was interested in exploring the commercial application of painted conductive ink technology, which involves printing electronic circuitry on flexible labels to provide interactive labelling. The application of such technology would be particularly helpful in a hospital environment, for example in patient wrist labels. Interactive patient wrist labels could contain information on the patient's medication and could be easily checked to ensure the correct medication was being prescribed to the patient. Should the technology be developed and

proven, application could be extended into new sectors such as the food sector where sensors could be incorporated into packaging to ensure food has been kept at the right temperature during transportation.

Key project objectives were to design and create: a process of printing electronic layers on flexible substrates, and a prototype with smart-printed RFID sensor tags for use in health and/or food monitoring.

Research partnership

Nuprint was partnered with the University of Glasgow's Bendable Electronics and Sensing Technologies (BEST) research team, based in the James Watt Nanofabrication Centre. With significant expertise and research experience in high-performance electronics and sensing systems, the University of Glasgow ensured the appropriate partnering arrangement to meet the research challenges set by Nuprint. The research team included three co-investigators, two research assistants, and two PhD researchers.

Project outputs

The projects focused on the development of printed and flexible sensing antenna, integration of sensing material with the antenna, temperature sensing characterisation, RFID antenna design, stretchable antenna, strain sensing, and printing of active electronics. The research led to the production of RFID antenna designs and optimisations, the development of a stretchable antenna; and the creation of concepts relating to food tags and QR barcodes. Performance evaluations were completed relating to dipole and patch antenna, and printing



over larger scale samples. At the close of the project development of a viable prototype was ongoing. It is expected that this work will be the key focus for the next phase of the Nuprint-University of Glasgow collaboration.

Participation in the project enabled Nuprint to investigate innovative sensor technologies for new markets and provided insights into the company's advanced manufacturing process. Enhancements were made to Nuprint's manufacturing process which supported the award of a medical grade production contract and CE certification for products.

Various organisations (in the pharmaceutical and health and social care sectors) have expressed an interest in the research outcomes. In order to progress such commercial opportunities Nuprint and University of Glasgow will continue collaboration after the end of the INTERREG VA funding period. The next phase of the research will prioritise development of a tangible example of these new labelling technologies.

Project benefits

- Access to academic R&D expertise and equipment
- Cross-border collaboration between the University of Glasgow, Atlantic Technological University and other NWCAM partners to deepen the understanding of printing smart flexible labels
- Development of two-way knowledge exchange between Nuprint and the University of Glasgow
- Increased competitiveness of the life and health sciences sector through innovation
- Industry-related skills development of academic researchers
- Knowledge dissemination to the wider life and health sciences sector through academic publications and conference presentations

- Technology transfer from University of Glasgow to Nuprint
- Upskilling of Nuprint staff with regards to smart sensor technologies

Project legacy

Professor Ravinder Dahiya, University of Glasgow, commented on the benefits of collaborating with Nuprint on this project: "Our engagement with Nuprint through the NWCAM project allowed us to develop an understanding of the company's product offering. With the aim of adding value to the product offering, we developed smart tags which could be printed onto the labels created by Nuprint. The research project demonstrated the feasibility of using smart tags in this way. Unfortunately, due to the pandemic we lost some project time and did not achieve the objective of integrating smart tags into Nuprint's current products. However, we have developed a strong working relationship with Nuprint, and we hope to continue collaboration on future phases of this research project."

With regards to future opportunities, Gavin Killeen (MD of Nuprint) noted: "This research has the potential to transform the scope of conductive labelling and ensure that Nuprint is in the vanguard of technical development and application to create more innovative products and solutions."