Post Doctoral Researcher Position

Advanced Manufacturing of Non-Linear Solid-State Devices for Microwave Applications

Laboratoire de Conception et d'Intégration des Systèmes, Grenoble Alpes University, Valence, France.

Microwaves and Antenna Engineering Group, Institute of Sensors, Signals and Systems, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, UK.

Project Description

Microwave and wireless systems require electronic reconfigurability to satisfy ever increasing spectrum requirements and to ensure functional agility at a better economic outlay. Present electronic reconfigurability mostly relies on conventional active semiconductor solutions based on metalloid and post transition metals, and their composites (e.g., Si/Ge/Te/Ga/As, etc.), that has certain technical limitations as well as some economic and environmental implications.

In the proposed research, the candidature is focused on exploring novel conventional and non-conventional methods for development and manufacture of linear and non-linear solid-state devices for microwave applications. The proposed methodology is based on solution processable semiconducting and conducting polymers and their composites, that has several advantages in comparison to conventional materials and methods like ease of manufacture – like low temperature printability, lower cost, etc. The research will involve technology development of active and passive two and three terminal solid-state devices, analysing novel techniques for rapid manufacture of the same, and related physical/mathematical modelling. This is a highly experimental activity and will focus on hybrid ambient techniques for device manufacture and standard clean room-based microfabrication, simultaneously, and undertake microwave devices and circuit design as well as material engineering in a broad perspective of tailoring material composites for intended microwave performance. Both hybrid microwave integrated circuits alongside with standalone discrete microwave devices with electronic reconfigurability will be a target of this study.

The recruited candidate is expected to immediately start working on the above, based on the strong background framework and plan of action laid by the supervisor Dr. Jayakrishnan Purushothama, and Prof. Etienne Perret, and will make use of the excellent state-of-the art resources available at the School of Engineering and Physical Sciences, Edinburgh, UK, and the Laboratoire de Conception et d'Intégration des Systèmes, of the Grenoble Alpes University, Valence, France, sharing their time in blocks at the two locations. The resources include advanced microwave engineering and wireless communication laboratory (with micro probing facilities, modern VNAs, VSGs, VSAs, source-meters, anechoic chambers, and similar), microfabrication clean room, sophisticated imaging & material analysis tools like SEM/EDAX, XRD, high-resolution optical microscopes, semiconductor parameter analysers, wet-chemistry labs, etc., to mention a few. This research and the supervisor have close collaboration and will be supported by several renown faculty and industrialists across the world.

Location: LCIS Laboratory of the Grenoble Alpes University, Valence, France. | Heriot-Watt University, Edinburgh, UK.

Duration: up to 12 months, with the possibility of extension subject to the availability of funding.

Deadline: Applications will be reviewed on a rolling basis and the position will remain open until a suitable candidate is identified.

Release date: July 2025.

Supervision team

Prof. Etienne Perret, Full Professor, Grenoble Alpes University, France.

Dr. Jayakrishnan M. Purushothama, Assistant Professor, Heriot-Watt University.

Candidate description and eligibility

A highly motivated candidate with a PhD degree or equivalent in electrical engineering, with a strong passion for RF/microwave engineering, microfabrication techniques, solid-state physics, and material science is sought herewith. Desirable: in addition to above qualifications, interest and expertise in chemistry/material-science would be advantageous.

How to apply

Interested candidates are invited to submit a concise CV (maximum of two pages), emphasizing research experience and publications, to J.M.Purushothama@hw.ac.uk. Please use "**Post Doc July 2025**" as the subject line of your email.

Please note CVs exceeding two pages or emails with incorrect subject lines may not be considered.

Relevant references

1. J. M. Purushothama, S. Lopez-Soriano, J. M. Purushothama, I. Susanti, B. Sorli, and E. Perret, "Electronically Rewritable Chipless RFID Tags Fabricated Through Thermal Transfer Printing on Flexible PET Substrates", IEEE Transactions on Antennas and Propagation, vol. 69, no. 4, pp. 1908-1921, April 2021. Doi: https://doi.org/10.1109/TAP.2020.3030965
2. S. Lopez-Soriano, J. M. Purushothama, A. Vena, and E. Perret, "CBRAM technology: transition from a memory cell to a programmable and non-volatile impedance for new radiofrequency applications", Nature Scientific Reports 12, 4105 (2022). Doi: https://doi.org/10.1038/s41598-022-08127-x
3. J. M. Purushothama, A. Vena, A. Meghit, B. Sorli, and E. Perret, "Nafion based fully passive solid-state conductive bridging RF switch", in IEEE Microwave and Wireless Components Letters, vol. 27, no. 12, pp. 1104-1106, Dec. 2017. Doi: https://doi.org/10.1109/LMWC.2017.2764741
4. P. Mahato, J. M. Purushothama, A. Vena, E. Perret, "Planar CBRAM devices using non-cleanroom techniques as RF switches", Appl. Phys. A 129, 438 (2023). https://doi.org/10.1007/s00339-023-06687-x

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