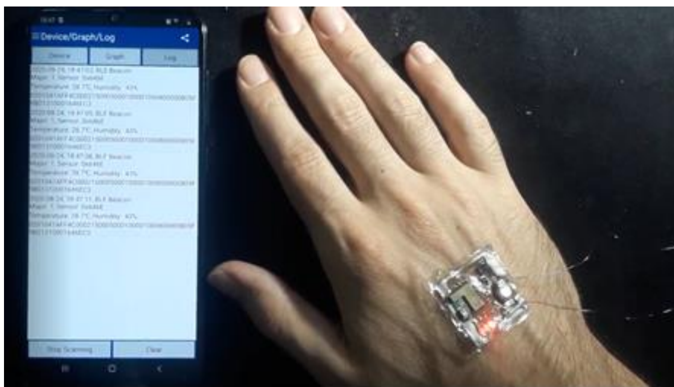
UNIVERSIDADE D COIMBRA BUSINESS

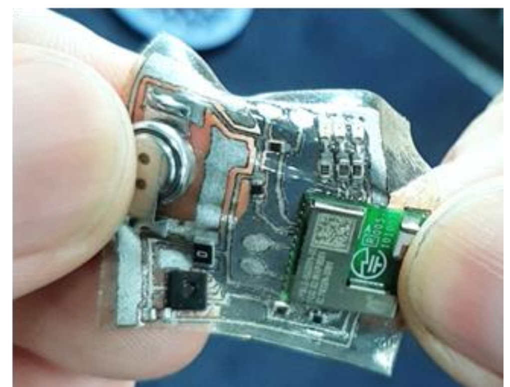
Technology Offer

Low-cost and Scalable Process for Microchips Integration into Stretchable Printed Circuits

KEYWORDS: Low-cost Hybrid Circuits; Microchip Interfacing; Printed and Stretchable Electronics; Recyclable Electronics; Scalable E-Textile; Scalable Fabrication.

Existing methods for fabrication of soft circuits are not automated, and require many fabrication steps. As traditional soldering is not possible in printed electronics, integration of Microchips has been the main problem of the field for over two decades. Our technology allows fabrication of complex soft-matter circuits in only two steps: Digital Printing through a consecutive, stretchable, sinter-free ink; Chemical Vapor Exposure for simultaneous a.Microchip Integration, b. Microcrack Healing (thus better mechanical performance), and c. autonomous encapsulation without the need for deposition of other materials. Unlike the existing methods, there is no need for high-resolution deposition of conductive binders, thermal sintering/soldering, and encapsulation. Everything is performed simultaneously. This process is compatible with heat-sensitive substrates, and can be used for scalable fabrication of e-textile. Our patent also covers a process for recycling of the printed circuits that in many cases are single/short-term use. It allows recovering all electronic microchips, and as well, the precious metals such as silver, and as well the polymer itself.





Example of complex microchip integrated circuit with Bluetooth

ADVANTAGES	APPLICATIONS
• Single-step process. • Self-soldering, Self-healing, Self-encapsulation of the stretchable circuits. • Solder-paste free. • Room temperature process. • Compatible with heat resistant substrates. • Possibilty of recycle printed circuits. • Reinforce the microship resilience. • Encapsulation of the circuit autonomously. • Low-cost & Scalabe Process. • Easy recovery of the electronic component, silicon chips, precious metal and the polymer.	• Biostickers for health monitoring. • E-textile (Health and Fashion). • Inks for 2D and 3D Printed Electronics. • Human Gait Monitoring Suit (Glove, Socks, Suits). • Pressure Monitoring Films (Rehab and Sport). • Touch control panels in cars. • Thin-film and Bendable Solar Cells. • Flexible Display. • Flexible and Stretchable Batteries and Super Capacitors. • Printed Antennas, 5G and 6G Antennas. • IoT, and IoMT.

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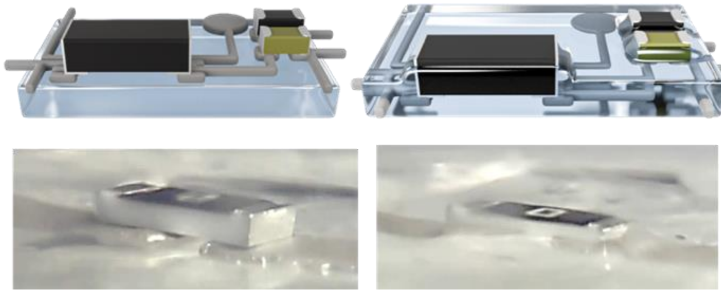
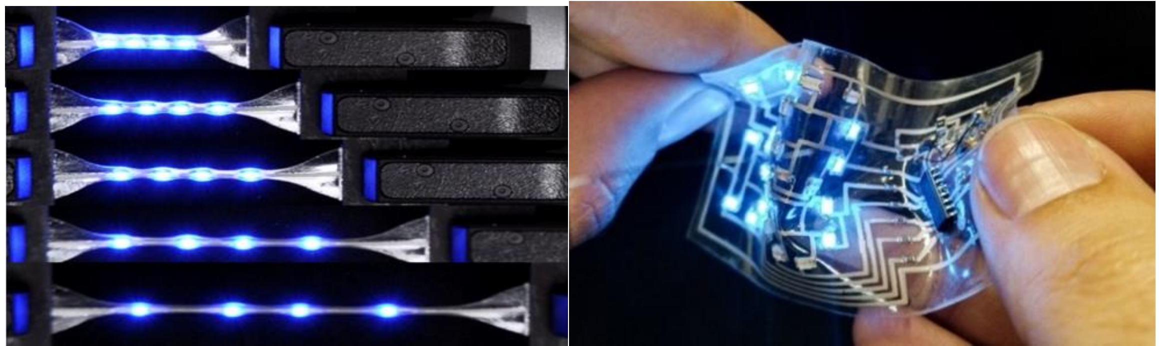


Single-step, room temperature Self-Soldering of Microchip

Recycling and recovering of components



Example of microchip integrated circuit, and the circuit under strain

VIDEO (QR Code or <u>YouTube</u>):

STAGE OF DEVELOPMENT: TRL 4

IPR LEGAL STATUS: Patent Pending n.º PCT/IB2022/051654 filed on 24/02/2022.

OWNERSHIP: The rights to the technology are held by the University of Coimbra.

COLLABORATION SOUGHT: The University of Coimbra is seeking commercial partners interested in further developing the technology under a joint-collaboration, license agreement or acquiring the existing rights.

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