PRESS RELEASE

ARTIFICIAL FINGERPRINTS: NEW FRONTIERS ON AUTHENTICATION

Istituto Nazionale di Ricerca Metrologica (INRiM) and Politecnico di Torino collaborate in an innovative research that opens new scenarios for the development of increasingly secure anti-counterfeiting technologies.

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Fingerprints, thanks to their uniqueness (there are no two individuals with the same fingerprints.), have been used for personal identification and to authenticate commercial transactions since the ancient kingdom of Hammurabi, in ancient Babylon (1955-1913 BC).

Over the centuries, fingerprints have been used both for the identification of an individual (determine the identity of a person) and to prove their authentication (verify if the person is actually who they claim to be). Nowadays, their usefulness is an integral part of everyday life: in fact, they are commonly used to access smartphones or PCs with a simple touch.

In a global context where counterfeiting has enormous economic implications and can compromise security, the development of artificial, unclonable fingerprints represents a crucial step forward. These fingerprints are applicable to a wide range of products and objects and can revolutionize anti-counterfeiting technologies, making them increasingly safe and effective.

The research article published in the prestigious journal *Nature Communications* from a research group of **INRiM** – The National Metrology Institute of Italy – and **Politecnico di Torino** marks an important step forward in the field of security and anticounterfeit.

This study, entitled "*Artificial fingerprints engraved through block-copolymers as nanoscale physical unclonable functions for authentication and identification*", [1] demonstrates the possibility to engrave fingerprints at the nanoscale thanks to nanotechnology.

These fingerprints, whose morphology can be codified into binary matrices like QR-codes, are in fact unclonable and can be exploited as univocal identifiers on a wide range of materials and products [2].

By taking inspiration from natural forming processes of human fingerprints, the research team exploited the self-assembly process of polymeric materials to generate artificial fingerprints at the nanoscale. The uniqueness of these fingerprints is guaranteed by the inherent stochasticity of the process itself, and therefore making the fingerprint extremely hard to replicate.

«*We have demonstrated that these artificial fingerprints are not only highly stable over time, but they can also withstand high temperature conditions* – say **Chiara Magosso** and **Irdi Murataj**, PhD student from Politecnico di Torino and researcher from INRiM, respectively – *making them suitable for numerous possible applications*».

«*Thanks to the development of image-based recognition algorithms* – add **Gianluca Milano** e **Federico Ferrarese Lupi**, researchers from INRiM – *we envision that these technologies lead to a new era in anticounterfeit that embraces the inherent stochasticity of nanoscopic self-assembly of materials*».

[1] I. Murataj, C. Magosso, S. Carignano, M. Fretto, F Ferrarese Lupi, M. Gianluca "*Artificial fingerprints engraved through block-copolymers as nanoscale physical unclonable functions for authentication and identification*". Nature Communications (2024). DOI: 10.1038/s41467-024-54492-8

[2] I. Murataj, C. Magosso, F Ferrarese Lupi, M. Gianluca, *patent submitted.*

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Contacts for media:

Istituto Nazionale di Ricerca Metrologica – INRiM
Communication Team
Manager. Barbara Fracassi
+39 011 3919 546
comunicazione@inrim.it

Politecnico di Torino
Ufficio web e stampa
Silvia Brannetti (resp.), David Trangoni
+39 011 0906319 – 3329
relazioni.media@polito.it