



Smart unclonable tags for cyber physical security

Riccardo Barberi, M. D. L. Bruno, E. Fuoco, C. Tone, M. De Santo

Physics Department, University of Calabria, via Bucci 31C, Rende (CS), Italy

Abstract

Nowadays, there is an increasing need for novel technical solutions for the authentication, identification and traceability of goods. Physical Unclonable Functions (PUFs) are the basis for highly secure anti-counterfeiting systems [1]. A PUF key is a physical manifestation of a cryptographic key, it is randomly generated and impossible to counterfeit.

Soft materials and, among them, liquid crystals are suitable candidates for the creation of PUFs since they are excellent optical materials capable to self-assemble in complex photonic structures and self-repair [2]. Here, we report on the possibility to obtain randomly generated photonic tags by using dye doped liquid crystal droplets encapsulated in a fluid matrix or in a thin solid film.

1. R. Pappu, B. Recht, J. Taylor, N. Gershenfeld, *Physical One-Way Functions*, Science 297, 2026 (2002)
2. R. Arppe and T.J. Sørensen, *Physical unclonable functions generated through chemical methods for anti-counterfeiting*, Nature Reviews Chemistry 1, 0031, 1 (2017)