Graphene-Biopolymer Based RFID Tag: A Low-cost, Flexible and Environmentally Friendly Alternative

Ursula F. S. Roggero[1,2,*]
Silvia V. G. Nista[2]
Hugo E. Hernandez-Figueroa[1]
Lucia H. I. Mei[3]
Stanislav A. Moshkalev[2]

[1]*School of Electrical and Computer Engineering, University of Campinas, 13083-970 SP, Brazil*
[2]*Center for Semiconductor Components and Nanotechnologies, 13083-870 SP, Brazil*
[3]*School of Chemical Engineering, University of Campinas, 13083-852 SP, Brazil*
*uroggero@decom.fee.unicamp.br

A conductive and flexible film based on a mixture of graphene and biopolymers have been used to fabricate a passive Ultra High Frequency (UHF) Radio Frequency Identification (RFID) tag consisting of a dipole antenna and a microchip on paper substrate. The preparation of the composite material, as well as the design, manufacturing and characterization of the tag are presented. The results of the fabricated tag are presented, focusing on the most relevant parameters for real applications: read range, dimensions and mechanical robustness. Read range of 9.3 m was reached with a conductivity of 2.3×10^4 S/m. It demonstrated that this material can be used for long-range applications, constituting a low-cost and environmentally friendly alternative unlike commercial metal-based tags.

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FIGURES

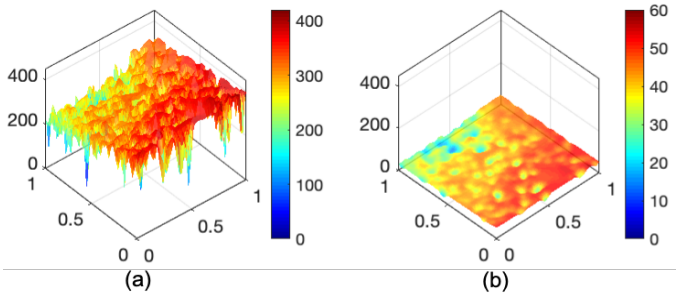

Figure 1: 3D profile from the substrate of a graphene sample (a) before and (b) after compression (all axes are in μm).

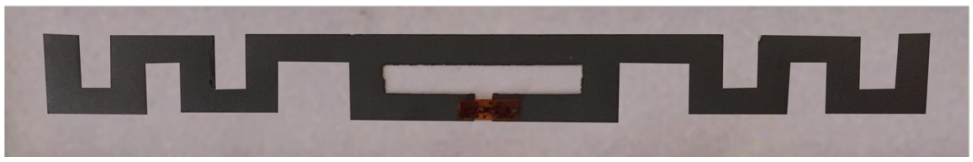

Figure 2: RFID tag fabricated.

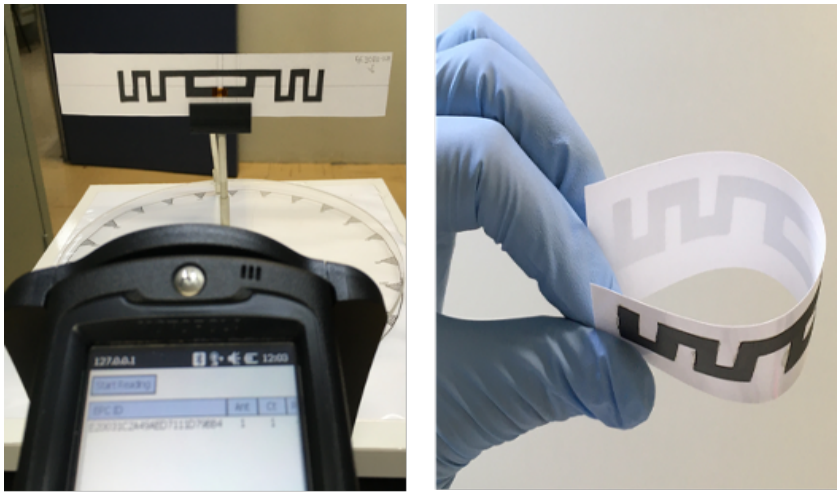

Figure 3: (a) Setup to measure the maximum read range. (b) Flexibility of the fabricated tags.