materials proceedings

MDPI

Abstract

Structural Cork in Ferroelectric Solid-State Devices by Scanning Kelvin Probe †

António Nuno Guerreiro [1] and Maria Helena Braga [2,*]

[1] Engineering Physics Department, FEUP, University of Porto, 4200-465 Porto, Portugal; nguerreiro@fe.up.pt
[2] LAETA-INEGI, Engineering Physics Department, FEUP, University of Porto, 4200-465 Porto, Portugal
* Correspondence: mbraga@fe.up.pt
† Presented at the Materiais 2022, Marinha Grande, Portugal, 10–13 April 2022.

Keywords: scanning Kelvin probe; cork; ferroelectric electrolyte; structural batteries; energy storage

Energy is a pillar in the socio-economic organization of modern society. In the last decade, we have had the development and implementation of new and various ways of generating energy, aiming for the production of clean energy with a subsequent reduction in fossil fuel dependency. Consequently, a wide range of products with electrical autonomy, from nanotechnology, wearables, cellphones, and laptops to vehicles, have been developed at a quick pace. In this scenario, energy storage and batteries are of paramount importance. The development of these areas is extremely relevant. The search for new and innovative materials makes the batteries more efficient, clean, and cheaper.

Cork is mostly used for making wine bottle stoppers. Nonetheless, it is used in vast and diverse areas such as construction, fashion industries, vehicles, and the aerospace industry. The objective of this project is to study cork [1] as a valuable and promising material for usage in structural batteries based on solid ferroelectric electrolytes [2,3].

The technique utilized for the study of the cork and structural batteries is the scanning Kelvin probe (SKP), a non-invasive technique that allows the electrochemical study of the surface of the cork by itself or combined with other materials [4,5]. Here we use the SKP technique in the research of various materials and cells that may prove to be innovative for obtaining better structural batteries (Figure 1) [2].

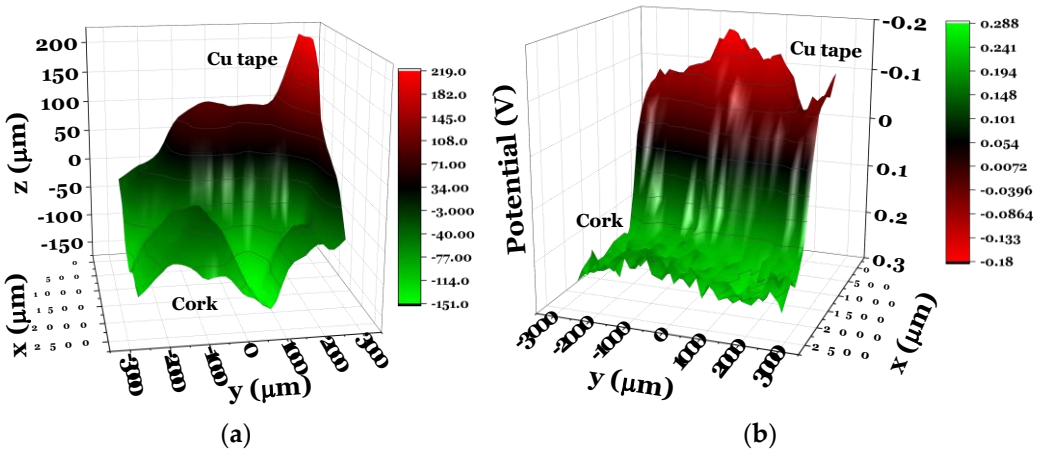

Figure 1. Surface topography by capacitive surface tracking (CST) and SKP of the surface of a Cu tape/cork junction; (**a**) CST and (**b**) SKP.

Author Contributions: Cell fabrication and SKP experiments: A.N.G.; conceptualization, formal analysis, supervision: M.H.B. All authors have read and agreed to the published version of the manuscript.

check for updates

Citation: Guerreiro, A.N.; Braga, M.H. Structural Cork in Ferroelectric Solid-State Devices by Scanning Kelvin Probe. *Mater. Proc.* **2022**, *8*, 114. https://doi.org/10.3390/materproc2022008114

Academic Editors: Geoffrey Mitchell, Nuno Alves, Carla Moura and Joana Coutinho

Published: 6 July 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Funding: This work was supported by the Portuguese Foundation for Science and Technology FCT UIDP/50022/2020 Emerging Technologies—LAETA and by the MatER project.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The authors will provide the data after a reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Chanut, J.; Wang, Y.; Dal Cin, I.; Ferret, E.; Gougeon, R.D.; Bellat, J.P.; Karbowiak, T. Surface properties of cork: Is cork a hydrophobic material? *J. Colloid Interface Sci.* **2022**, *608*, 416–423. [CrossRef]
2. Braga, M.H.; Murchison, A.J.; Goodenough, J.B. Dataset on a primary lithium battery cell with a ferroelectric Li-glass electrolyte and MnO2 cathode. *Data Brief* **2020**, *29*, 105339. [CrossRef]
3. Braga, M.H.; Ferreira, J.A.; Stockhausen, V.; Oliveira, J.E.; El-Azab, A. Novel Li 3 ClO based glasses with superionic properties for lithium batteries. *J. Mater. Chem. A* **2014**, *2*, 5470–5480. [CrossRef]
4. Zance, S.S.; Ravichandran, S. Electrochemical surface modification of carbon for enhanced water electrolysis. *Appl. Phys. A* **2019**, *125*, 1–7. [CrossRef]
5. Pötzelberger, I.; Mardare, C.C.; Burgstaller, W.; Hassel, A.W. Maximum electrocatalytic oxidation performance for formaldehyde in a combinatorial copper-palladium thin film library. *Appl. Catal. A Gen.* **2016**, *525*, 110–118. [CrossRef]