

Abstract

Flexible Piezoelectric Thin Films for Podiatric Sensors with Wireless Communication [†]

Samia Adrar ^{1,*} , Mohammed El Gibari ¹, Philippe Saillant ², Arnaud Chambellan ², Marc Jubeau ² and Raynald Seveno ¹ 

¹ Faculté des Sciences et Techniques, Université de Nantes, CNRS, IETR UMR 6164, 2 Chemin de la Houssinière, 44322 Nantes, France; mohammed.el-gibari@univ-nantes.fr (M.E.G.); raynald.seveno@univ-nantes.fr (R.S.)

² Institut du Thorax, Movement-Interactions-Performance, Université de Nantes, CHU de Nantes, 44322 Nantes, France; psaillant@wanadoo.fr (P.S.); arnaud.chambellan@chu-nantes.fr (A.C.); marc.jubeau@univ-nantes.fr (M.J.)

* Correspondence: samia.adrar@etu.univ-nantes.fr

[†] Presented at the 8th International Symposium on Sensor Science, 17–28 May 2021; Available online: <https://i3s2021dresden.sciforum.net/>



Citation: Adrar, S.; Gibari, M.E.; Saillant, P.; Chambellan, A.; Jubeau, M.; Seveno, R. Flexible Piezoelectric Thin Films for Podiatric Sensors with Wireless Communication. *Eng. Proc.* **2021**, *6*, 48. <https://doi.org/10.3390/I3S2021Dresden-10127>

Academic Editors: Gianaurelio Cuniberti and Larysa Baraban

Published: 17 May 2021

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



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: For reasons of availability and cost, patients are sent home increasingly early, with limited follow-up due to the complexity and size of medical devices. In this context, researchers from IETR and MIPS laboratories are working on a device which should monitor the progress of a patient, in order to detect early the aggravation of a disease such as Chronic Obstructive Pulmonary Disease (COPD) or diabetes with walking disorders. The device is based on flexible piezoelectric thin films (3 µm thick) that can be used as podiatric sensors and have been developed by the IETR laboratory. The originality of this work lies both in the approach to the design of the gait-monitoring device—because it was carried out directly in consultation with a doctor from the University Hospital of Nantes and a podiatrist—and in the portability of the device, which should eventually allow the follow-up of a patient at home. For this study, the flexible piezoelectric sensors have been elaborated using a Chemical Solution Deposition (CSD) process and a commercial aluminum (Al) foil as substrate. In order to increase the flexibility of sensors and to aid its insertion in a shoe, piezoelectric films have been encapsulated by lamination into polyethylene terephthalate (PET, 150 µm). In this paper, the elaboration and characterization of flexible piezoelectric sensors, analog-to-digital converter and wireless communication protocol used for data transmission are presented.

Keywords: podiatric sensors; piezoelectric thin films; wireless communication

Supplementary Materials: The presentation file is available at <https://www.mdpi.com/article/10.3390/I3S2021Dresden-10127/s1>.