Designação do Projeto|	FLEXIDEVICE - Desenvolvimento de materiais sustentáveis para aplicações em dispositivos para electrónica flexível e geração de energia
Código do Projeto|	LISBOA-01-0145-FEDER-029671
Objetivo Principal|	Reforçar a investigação, o desenvolvimento tecnológico e a inovação
Região de Intervenção|	Lisboa
Entidade Beneficiária|	FCiências.ID – Associação para a Investigação e Desenvolvimento de Ciências
Data de Aprovação|	09-05-2018
Data de Início|	10-08-2018
Data de Conclusão|	09-08-2022
Custo Total Elegível|	13.737,50€
Apoio Financeiro da União Europeia|	FEDER – 5.495,00€
Apoio Financeiro Público Nacional/ Regional|	OE – 8.242,50€

Objetivos

« FLEXIDEVICE goal is to design sustainable nanoengineered functional materials for emerging flexible electronics and mechanical energy harvesting. The "Internet of things" is a new paradigm. Portable multifunctional devices require scaling down; cost reduction; and performance. Flexibility and stretchability allied to nanopatterning must be explored to design the new generation of electronic and mechanical energy harvesting devices. Moreover, devices must fulfill the "Circular Economy" concept. FLEXIDEVICE challenges are: 1) Processing and characterization of metal oxide thin films in flexible biodegradable substrates; 2) Evaluation of structure-microstructureproperty relationships; 3) Design of laboratorial scale prototype devices for sensing, actuation and energy generation. FLEXIDEVICE will generate breakthroughs by combining know-hows on materials of researchers of CICECO-UA and IM2NP with advanced characterization of B. Rodriguez at UCD and researchers at BioISI-FCUL.»

Atividades

«• Tese de Mestrado: Dayana L. Guzmán Sierra, BIONANOCOMPÓSITOS PIEZOELÉTRICOS FLEXÍVEIS PARA SENSORES BIOMÉDICOS, Tese de Mestrado; dezembro 2018.

Participação em conferências:

- Ferreira, Paula; Sierra, Dayana; Nunes, Cláudia; Vilarinho, Paula, Flexible chitosan-based BaTiO3 piezoelectric composites, AAAFM-UCLA International Conference on Advances in Functional Materials 2019l, 483. August 2019, UCLA, Los Angeles, USA. Oral Invited
- Paula Ferreira, Dayana L. Guzmán Sierra, Cláudia Nunes, Igor Bdikin, Paula M. Vilarinho, Manuel António Coimbra, Towards polysaccharide-based piezoelectric materials, The International Conference on Polysaccharides for Nutraceuticals and Biomaterials (ICPNB-2019). Nov. 2019, Shezheng, China - Oral Invited
- Paula Ferreira, Discovering new ways to develop functional materials, Humboldt Coloquium, Abril de 2019, Madrid, Espanha - Oral Invited
- Paula Ferreira, Bio-based materials: preserving Humboldt's Nature, HUMBOLDT-KOLLEG TO GRASP THE WHOLE WORLD, On the 250th Anniversary of Alexander von Humboldt, Dezembro de 2019, Lisboa, Portugal. - Oral Invited
- Silva M.R.F., Góis F.L.S., Ferreira P., Vilarinho P.M., Microwave-assisted versus conventional oven hydrothermal synthesis on the preparation of piezoelectric BaTiO3 nanoparticles, Materiais 2019, 276. Abril 2019, Lisboa, Portugal – poster
- Dayana L. Guzmán Sierra, Cláudia Nunes, Paula M. Vilarinho, Paula Ferreira, Mechanical and dielectric characterization of Chitosan-BaTiO3 composites, Materials 2019, Lisboa. - oral.
- Guzman, D.; Ferreira, P; Nunes, C.; Vilarinho, P. Chitosan-BaTiO3 bionanocomposites for flexible piezoelectrics. Jornadas CICECO 2019, Aveiro, Portugal, 11-12 junho 2019, 56.

artigos publicados:

- Flexible Piezoelectric Chitosan and Barium Titanate Biocomposite Films for Sensor Applications, Sierra, DLG; Bdikin, I; Tkach, A; Vilarinho, PM; Nunes, C; Ferreira, P, 2021, EUROPEAN JOURNAL OF INORGANIC CHEMISTRY, 2021, 9, 792-803.
- Multifunctional nanopatterned porous bismuth ferrite thin filmsCastro, A; Martins, MA; Ferreira, LP; Godinho, M; Vilarinho, PM; Ferreira, P, 2019, JOURNAL OF MATERIALS CHEMISTRY C, 7, 25, 7788-7797»

Resultados Esperados / Atingidos

« FLEXIDEVICE was focus on the preparation of colloid particles of barium titanate by hydrothermal methodologies and patterning of bismuth ferrite thin films as proposed in tasks 2.1 and 2.2; study of the transferring of films from rigid substrates to flexible

(task 3.1) and integration of particles into biopolymers. The piezoelectric nanostructure prepared were characterized in terms of structure, morphology and electrical properties according to tasks 6. Task 4 was focus on using UV treatment and microwave to reduce the crystallization temperature of the perovskite structures. Some results show the possibility of decreasing considerably the crystallization temperature of barium titanate. KNN fase was used to show the potential of UV irradiation on decreasing the crystallization temperature. Chitosan flexible composites were prepared and studied in terms of piezoelectric and electromechanical response and have demonstrated that chitosan may be a promising substrate for flexible devices. »