

Development of fibers and textiles structures for energy harvesting and storage

António Marques, Joana Fonseca, André Pinto, Miguel Ribeiro, José Gonçalves, Nelson Durães,
Nelson Cardoso, João Gomes

*CeNTI - Centre for Nanotechnology and Smart Materials, Rua Fernando Mesquita, 2785 - 4760-034,
V.F.Famalicão, Portugal*

Contact: amarques@centi.pt

Abstract

Energy harvesting for autonomous energy generation is one of the main objectives for many researchers as the need for off grid energy generation devices increases. Also, the storage of the generated energy has been addressed in the last years, with the aim of producing thin, lightweight and easily integrated battery/supercapacitor.

Solar cells for electricity generation using photoelectric materials have been a reality for many years. The more efficient and durable solar cells are bulky, rigid and present many limitations regarding their integration in flexible structures. Other PV technologies are available to produce light and flexible solar cells but so far the cost/efficiency/durability is still an issue to be tackled.

One way to develop structures that collect and store sun energy is to design and develop these features directly integrated on a complex flexible fibrous matrix and yarn. This approach provides added functionalities in a textile format, with benefits of reduced weight, an unobtrusive appearance, flexibility, conformability, easier storage and transportation than existing systems.

This development provides a wide range of new application and design opportunities in smart clothing (e.g. biomedical diagnostics and monitoring, sensing and display), telecoms (e.g. power for mobile devices), transport and safety (e.g. integrated power in inflatable rafts, safety clothing), disaster relief (e.g. smart energy generating tents, rescue gear) and leisure wear (e.g. sports goods incorporating sensors).

Currently the different fibers and structures are being optimized. The development of these fibers requires not only the materials development but also the development of the structure of the fibers and the coating techniques. Experimental results regarding the optimization of the fibers structure, the mechanical and electrical characterization of the fibers and the performance of the fibers will be presented.

References

[1] Authors, Journal, **Issue** (Year) page.

Figures