Towards Cancer Diagnosis in Point-of-Care

M. Goreti F. Sales

BioMark/ISEP, School of Engineering of the Polytechnique School of Porto, Portugal.

Tel.: +351 228 340 544. E-mail: goreti.sales@gmail.com; mgf@isep.ipp.pt.

Cancer diseases remain a major public health concern, being breast, cervical and colorectal cancers the most frequently occurring forms of the disease in the EU. Evidence-based strategies for early recognition and management of patients with cancer throughout the population have been successfully implemented, aiming ultimately at cancer detection in early stages. Substantial improvements are however required to design innovative devices that become readily available for point-of-care use.

Cancer is the phenotypic end point of numerous genomic and/or epigenomic changes accumulated in cells. Within the typical long course of each cancer disease, there are several biochemical alterations that may be followed in body fluids, mostly (but not only) protein materials and other smaller sized metabolites, usually recognized as cancer biomarkers. Screening such biomarkers may turn out a valuable tool for screening the disease, most especially when these are circulating in blood, urine, or saliva, allowing non-invasive procedures. There are few devices described so far for targeting cancer biomarkers, relying mostly in electrical signals and employing antibody biomaterials as biorecognition layer, producing label-free and sensitive determinations.

The activities under the scope of the Starting Grant 3P's, currently in action, are meant to create a new device that (i) employs plastic antibodies instead of the corresponding natural biomaterials, leading lower cost and higher stability operations; (ii) and makes use o photovoltaics to confer full autonomy to the electrical device. This is the first attempt to design a biosensing electrical device linked to a photovoltaic cell. It has been successfully achieved in a first approach for carcinogenic embryonic antigen (CEA), a cancer biomarker. The device is currently subject of further improvements.

Acknowledgements:

The author acknowledges the *European Research Council* for the *Starting Grant* 3P's funding (GA 311086).