Selective Single-Molecule Detection of clinically relevant biomarkers with an Organic Transistor

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ABSTRACT: The *US National Institute of Health* defines biomarkers *as molecules that can be objectively measured and evaluated as indicators of normal or disease processes and pharmacologic responses to therapeutic intervention*. Among the plethora of biomarkers, the sensitive detection of proteins is of paramount importance in a number of clinical fields.[1] The clinical use of protein biomarkers as indicators of the onset of pathological states requires the measurement of low concentrations of proteins in complex samples. Attempts to develop ultra-sensitive assays for the detection of protein biomarkers have been done by several groups in the last few years. Although in the last decade many approaches to achieve ultra-sensitive detection have been developed, most of them require complicated assay set-ups, hindering their adoption in point-of-care applications. In this perspective, Electrolyte-Gated Field-Effect-Transistors (EG-FETs) [2-6] with a bio-functionalized gate electrode, appear as very promising biosensing platforms. The EG-FET device herein presented, able to operate in physiologically relevant fluids such as blood serum and saliva, will set the ground to a major revolution in biosensing applications for early clinical detection.

1. Barletta J.M. et al. **2004**, *Am. J. Clin. Pathol.*, 122, 20-27.
2. Macchia E. et al. **2018** *Nature Communications*, 9, 3223.
3. Macchia E. et al. **2019** *Chemistry of Materials*, 31, 6476–6483.
4. Macchia E. et al. **2019** *Analytical and Bioanalytical Chemistry*, 411, 4899–4908.
5. Macchia E. et al. **2020** *ACS Sensors*, 2020, 5, 1822–1830.
6. Macchia E. et al., **2020** *Analytical and Bioanalytical Chemistry*, 2020, 412, 811–818.

Short BIO: Dr. Eleonora Macchia is currently Assistant Professor, tenure track, at Department of Pharmacy of University of Bari. She has been Senior Researcher – Cathegory B at Åbo Akademi University since August 2020, as PI of the project "Protein Detection at the Single Molecule Limit with a Self-powered Organic Transistor for HIV early diagnosis (ProSiT)" funded by Academy of Finland Research Council (GA#332106). Since March 2019, she has been project researcher at Åbo Akademi University, in the framework of the H2020 European project "Single molecule bio-electronic smart system array for clinical testing SiMBiT" (GA#824946). Previously, she has been Postdoctoral fellow at University of Bari. She received her PhD in Chemical Sciences summa cum laude in 2018 from the University of Bari and her Master's degree in Physics 110/110 cum laude in 2014 from the same institution. Among other activities, she was selected as Guest Speaker for the event "Global Women Breakfast event 2021" sponsored by IUPAC at Navyug Kanya Mahavidyalaya University. Moreover, she was selected as role model for the project Inspiring Girls funded by the association Valore D and sponsored by Eni and Intesa San Paolo.

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