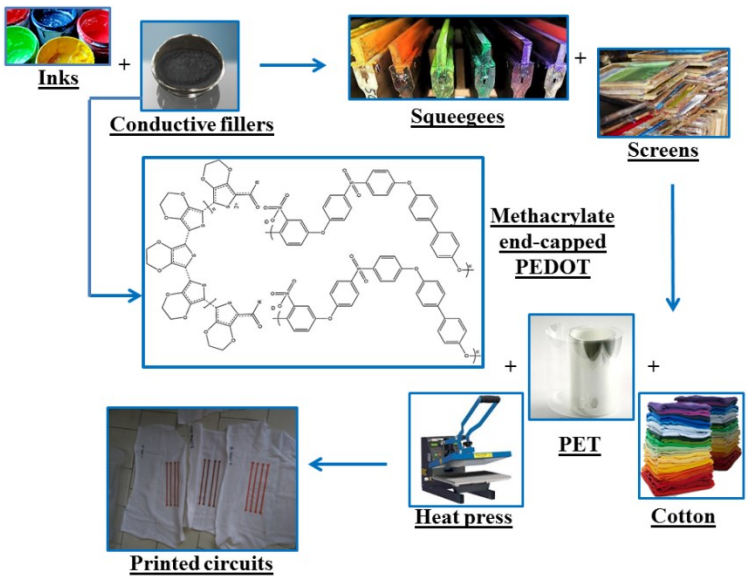
# CONDUCTIVE INKS BASED ON METHACRYLATE END-CAPPED POLY(3,4-ETHYLENEDIOXYTHIOPHENE) FOR PRINTED, FLEXIBLE AND WEARABLE ELECTRONICS

**Valentina Sabatini [a,b], Hermes Farina [a,b], Marco Aldo Ortenzi[a,b]**

[a] Department of Chemistry, University of milan, Via Golgi 19, 20133, Milan, Italy;
[b] CRC Materials&Polymers (LaMPo), University of Milan, Via Golgi 19, 20133, Milan, Italy;
valentina.sabatini@unimi.it; hermes.farina@unimi.it, marco.ortenzi@unimi.it

A new synthesis of methacrylate end-capped Poly(3,4-ethylenedioxythiophene) (PEDOT) was performed: the new material obtained is soluble in common organic solvents, thus overcoming the well-known technical problems related to the use of commercial PEDOT in different printing technologies, such as screen printing, due to its poor processability and compatibility in formulations with other resins and polymers [1].
The new synthetic method developed is based on the direct oxidative polycondensation of 3,4-ethylenedioxythiophene (EDOT) in the presence of an oxidant species and a cross-linkable end-capper, i.e. methacrylate end-capped EDOT (mEDOT), prepared via Friedel Crafts acylation with methacryloyl chloride. The oxidative polycondensation between EDOT and mEDOT monomers in the presence of a new kind of doping agent, Sulfonated Polyarylethersulfone (SPAES) [2, 3] - characterized by different degree of sulfonation (DS) - was conducted, leading to functional end-capped conducting PEDOT, with conductivity of 210 S/cm, 50 S/cm higher than the one of commercial PEDOT [6].
Thanks to the enhancement of solubility, leading to better processability, end-capped PEDOTs were formulated with a thermoplastic ink, Plastisol®, and electronic circuits were successfully screen printed on flexible textile substrates [4, 5], in order to obtain wearable electronic circuits [7] (Figure 1).




**Figures 1** – Printed, flexible and wearable electronic circuits.

**References.**

1. V. Sabatini; H. Farina; M. A. Ortenzi *AIP.* **2016,** *1736,* 020082.
2. V. Sabatini; S. Checchia, H. Farina; M. A. Ortenzi *Macromol. Res.* **2016,** *24,* 800.
3. L. Falciola, S. Checchia, V. Pifferi, H. Farina, M. A. Ortenzi, V. Sabatini V. Sabatini; H. Farina; M. A. Ortenzi *Electrochim. Acta.* **2016,** *194,* 405.
4. IT patent P62129IT00 (2016) V. Sabatini; G. Bisutti, G. Di Silvestro, H. Farina; M. A. Ortenzi.
5. IT patent P62528IT00 (2016) V. Sabatini; G. Bisutti, G. Di Silvestro, H. Farina; M. A. Ortenzi.
6. V. Sabatini; H. Farina; M. A. Ortenzi *Polym. Eng. Sci.* **2016,** *Accepted, in press*.
7. IT patent P62449IT00 (2016) V. Sabatini; G. Bisutti.