# Intrinsically conductive polymer for 3D printing applications

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Today 3D printing is a well-established technique to obtain prototypes and customized devices, especially in the field of polymeric additive manufacturing. Also, small to big companies have started to host a 3D printer in their R&D offices to quickly and easily convert ideas into physical models. Hence, a big effort has been done by 3D printers producers to improve both printing accuracy and optimize building times, achieving surprising results. However, advancements in the field of printable materials don't run in tandem with technological improvements, especially as regards functional materials. Functional materials are characterized by different properties, for example magnetic permeability, thermal or electrical conductivity. Therefore, not only industrial but also academic requests should be met. Indeed, the employment of performant functional materials could lead to the printing of functional prototypes in small batches to perform tests or experiments.

With this view, the present work aims to introduce a novel electrically conductive photocurable resin to print devices by stereolithography. The reported resin is made up by the mixing of poly(ethylene glycol) diacrylate (PEGDA) with poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS). PEDOT is an intrinsically conductive polymer which has already been reported in literature to fabricate biocompatible and conductive samples [1,2]. The resin composition as well as the printing parameters were studied and optimized to successfully build complex 3D parts (Figure 1).

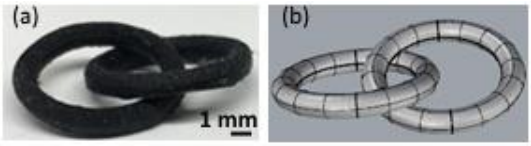


Figure 1. Chain printed with PEGDA-PEDOT resin. (a) printed part, (b) virtual model

Apart from relatively good mechanical properties, this PEGDA:PEDOT (5:1) composite resin showed remarkable electrical conductivity and improved surface wetting properties. Thus, it is a suitable light-

weight material fully exploitable and integrable in miniaturized systems like microsensors, MEMS and microfluidics devices.

References

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