





Printed electronic for electromagnetic Non Destructive Testing

ELyT Global
Theme: Electromagnetic NDT
Scientific topic: Electromagnetic instrumentation

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Abstract

Electromagnetic NDT testing has played a major role in revealing flaws, defects and mechanical behaviors of ferromagnetic as well as para-magnetic materials [1][2]. This lays the technical groundwork for performing materials characterization, through physical testing and measurement principles or by developing industrial-scale inspection systems [3]. Eddy current testing has been massively used by instance to observe delamination failures in carbon fibers composites [4].

Printed electronic (PE) is defined as a set of ink based printing methods used to create electrical devices on various substrates [5]. By combining manufactured electronics to text/graphic prints, one can obtain high-quality electric devices with outstanding properties including ultra-thin thicknesses, flexible, wearable, ultra-light, varying geometry, and low cost [6]. The recent progress of PE is mainly due to improvements in printing technologies but also due to the development of new

materials including a variety of conductive inks (CI). CI materials are typically created by infusing graphite or other conductive particles like silver, copper, gold or others in an ink base. Recently, even more functionalities have been obtained by replacing the conductive particles to other nature of particles, such as magnetic or piezo-electric ones.

4D printing is derived from the PE and the CI but extending it to complex geometries. Up to 5 axes printers can be used to print CI or others improved inks on subtract of random geometries.

In this project, our idea is to use the CI and the PE methods to print electromagnetic sensors on the surface of steel or carbon fibers composites. The size of the classic NDT sensors makes sharp geometries (including right angles ...) extremely complex to be controlled. Such geometries will be targeted. Eventually, the printed sensors will be used for in situ real time structural health monitoring of isolated elements and this without removing a large number of elements to get access to the controlled component.

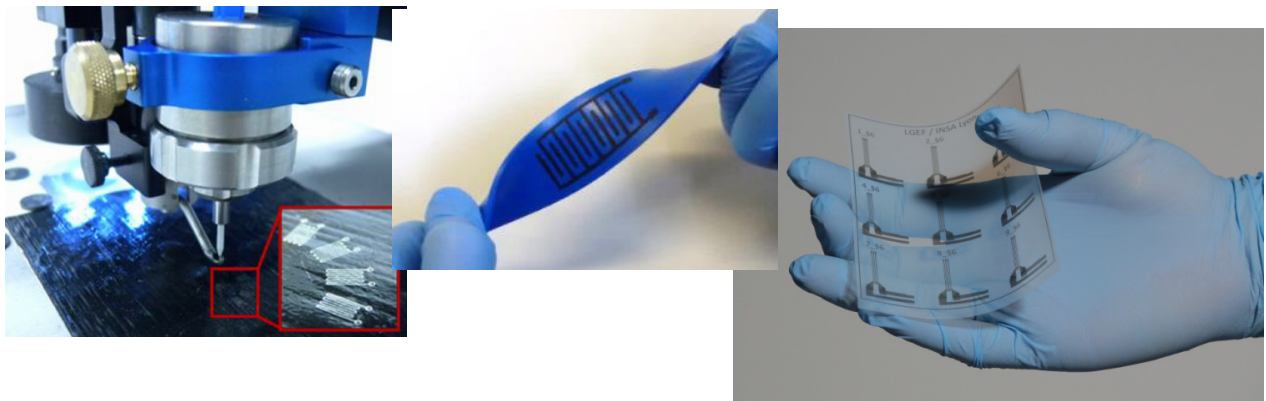


Fig. 1 -illustration for printed electronic and conductive ink.

References

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