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Batchelor, John C., Parker, Edward A., Ziai, Mohamed A., Sanchez-Romaguera, Veronica and Yeates, Stephen (2013) *Ultra thin and transfer tattoo UHF RFID tags*. In: Proceedings of PIERS Stockholm 2013. 1 (1). pp. 1-2. Progress in Electromagnetics Research Symposium (PIERS) ISBN 978-1-934142-26-4.

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Ultra thin and transfer tattoo UHF RFID tags

This paper describes inkjet printing as a digital fabrication tool for the manufacture of RFID tags on flexible and porous substrates (i.e. paper). The RFID tag presented is a single layer, ultrathin UHF tag in the form of a transfer tattoo, [1] which evolved from ultra-thin, substrate insensitive tag designs, [2]. Operation has been demonstrated when mounted direct on the skin with initial read ranges in the region of 1m and subsequent improvements have enabled read range increases. The implications of ink sintering processes for paper based transfer tattoos will be discussed as specifically applied to this work, [3], and resulting patch conductivities and read ranges highlighted for tags printed on tattoo transfer paper, [4]. Recent developments in selective ink layering will be outlined to illustrate the benefits to cost effective fabrication and efficient tattoo patch operation. Finally, work integrating additional components to improve transponder efficiency will be presented and leading to the concept of an ultra-thin battery for power assisted tagging where on-skin read ranges of 6m are possible. The issues for fabrication will be discussed for deposition and fabrication of such ultra-low profile sensitive tattoo tags.

1. M. Ziai and J. Batchelor, *Temporary On-Skin passive UHF RFID Transfer Tag*, *IEEE Transactions on Antennas and Propag.*, **2011**, 59(10), 3565.
2. M. Ziai and J. Batchelor, *Thin ultra high-frequency platform insensitive radio frequency identification tags*, *IET Microw. Antennas Propag.*, **2010**, vol. 4, pp. 390–398.
3. V. Sanchez-Romaguera, M.B. Madec, S.G. Yeates, *Ink-jet printing of conductive polymers for smart textiles and flexible electronics*. Materials Research Society Symposium Proceedings, **2009**, 1192E(Materials and Devices for Flexible and Stretchable Electronics), No pp. given, Paper #: 1192-PP14-04.
4. http://www.craftycomputerpaper.co.uk/-Inkjet-Tattoo-Paper_CPJ316I.htm

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