

Large Area THz MEMS Device Fabrication by Roll-to-Roll Printing Techniques

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Context Metamaterial structures are used for example in the split ring resonator (SRR) MEMS filter arrays. In this work plastic based THz MEMS device with electrical controlling will be realized. Schematic design is shown in Fig. 1. Roll-to-roll suitable manufacturing methods make it possible to develop novel large area applications (such as tunable THz scanner) as well as to lower manufacturing cost in the future. Novel metamaterial structures for RF, THz and microwave applications exhibiting new behaviors and characteristics have been studied for years. For example technologies for future generation of large and flexible display panels were derived from RF applications.

Objectives&Methods Our first manufacturing approach is based on totally inkjet printed device and second approach on combination of inkjet and flexographic printing techniques. With inkjet printing GHz devices have been shown but with combinatorial method also THz will be possible to prepare in the future. This is due to the limitation of achievable linewidths of these methods. Research work is needed to optimize inkjet printing parameters for electrically conductive materials as well as for spacers. Roll to roll suitable manufacturing method based on inkjetting and flexographic printing is shown in Fig. 2.

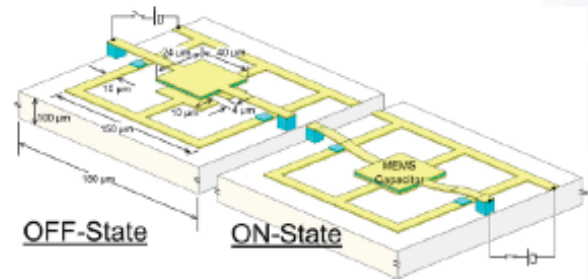


Fig. 1. Unit cell of a tunable metamaterial THz filter with an electrostatic RF-MEMS capacitor (from Zhengli et al., Toshiyoshi lab).

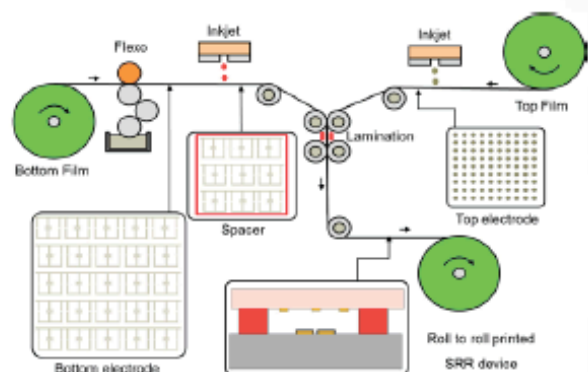


Fig. 2. Roll to roll manufacturing process for future THz MEMS device.

References and Publications

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- [2] Han, Z, et al., Abstract O-T01-0077, 7th Asia-Pacific Conference on Transducers and Micro/Nano Technologies June 29 - July 2, 2014 / EXCO, Daegu, Korea