

Fabrication of Dielectric Ceramic/Polymer Thick Films via Inkjet Printing for Flexible Applications

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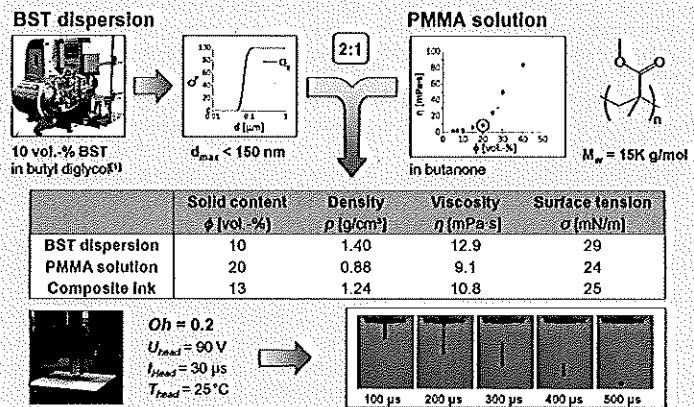
Motivation

Inkjet printing offers a high flexibility for the selective deposition of functional materials and is therefore a versatile manufacturing tool for printed electronics, such as capacitors.

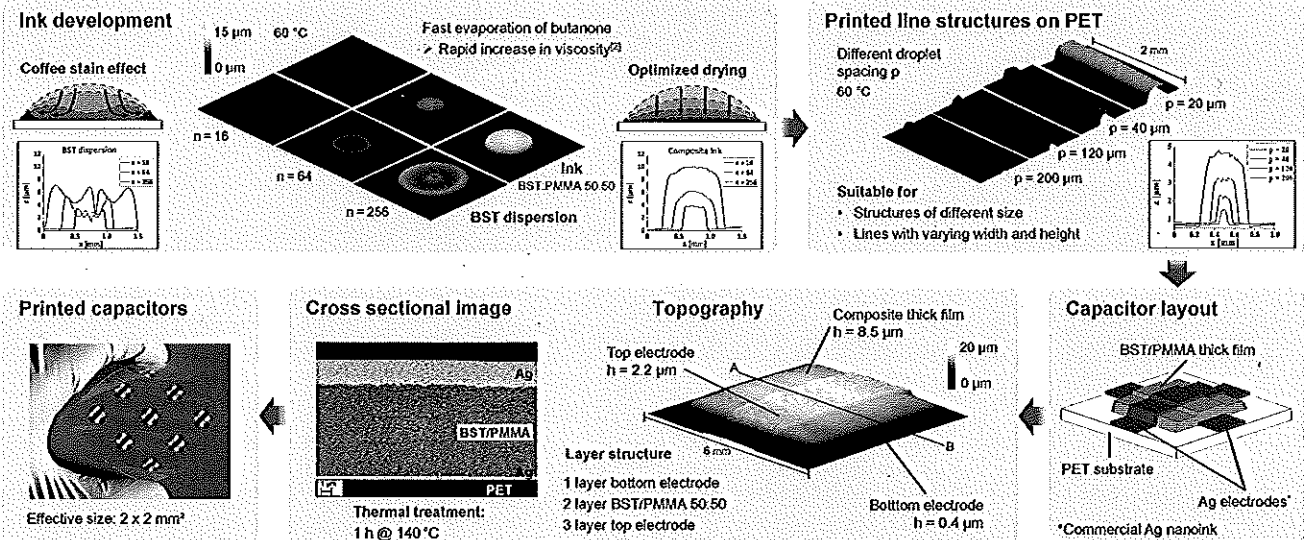
Currently, there is a growing interest in the preparation of flexible dielectric thick films with inkjet printing. However, mainly polymers can fulfill the temperature requirements of flexible substrates, but in contrast to ceramics, they exhibit only low permittivity.

This poster displays a novel preparation route of flexible dielectric thick films via inkjet printing. The use of a ceramic/polymer composite ink allows process-temperatures below 150°C as well as a one-step fabrication. The composite ink is prepared by combining a barium strontium titanate (BST) dispersion with a poly(methyl methacrylate) (PMMA) solution. The development of an ink with a 50:50 volume ratio of BST and PMMA is presented. The optimized drying behavior of the ink is shown as well as the topography of printed structures. Finally, the fabrication of all-inkjet-printed Metal-Insulator-Metal (MIM) capacitors is shown and the dielectric properties are characterized.

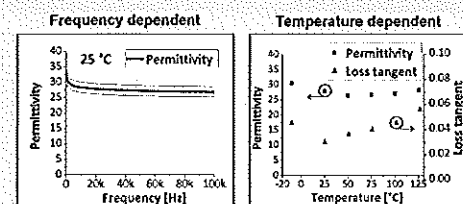
Ink Preparation and Ink Properties



Fabrication of Flexible All-Inkjet-Printed MIM Capacitors



Dielectric properties



Conclusion

- Successful development of a dielectric BST/PMMA composite ink for inkjet printing
- One-step fabrication of smooth thick films without any drying inhomogeneities
- Diverse layouts and structures of different size can be printed
- Fabrication of flexible all-inkjet-printed MIM capacitors was demonstrated
- Promising results for the dielectric properties of the printed composite thick films were obtained

Literature:

- [1] A. Friederich et al., "Rheological control of the coffee stain effect for inkjet printing of ceramics", *J. Am. Ceram. Soc.* 96.7 (2013)
- [2] M. Mikolajek et al., "Direct Inkjet Printing of Dielectric Ceramic/Polymer Composite Thick Films", *Adv. Eng. Mater.* 10.1002/adem.201400451

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