

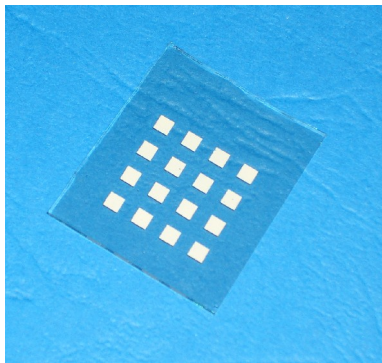
Motivation

- composites of PVDF-TRFE and PZT have higher dielectric constant as well as better pyroelectric and piezoelectric properties than other polymer-ceramic composites
- thus they are interesting materials for sensor and actuator applications
- screen printing is a widely used and cheap process for large scale production of active and passive elements

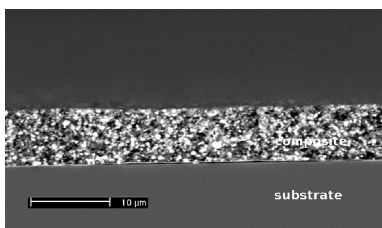
Overview

- composites of polymer PVDF-TrFE and a commercial PZT powder (PZ21, Ferroperm®) have been screen-printed with PZT volume content up to 50 vol% on ITO-coated glass and silicon substrates
- by choosing a suitable solvent, a printable paste could be obtained by a simple evaporation technique

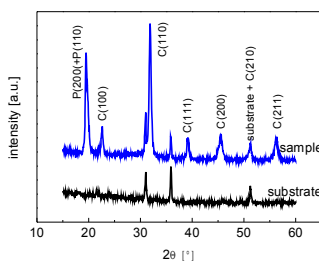
Structure



- Photograph show a printed structure of an array of 2x2 mm squares on ITO-coated glass
- structures down to 200µm have been screen printed

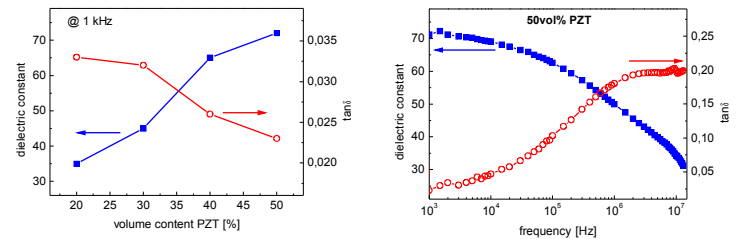


- BSE-SEM image of a screen printed composite with 20 vol% PZT
- image shows a good distribution of the ceramic particles in the polymer matrix



- XRD of composite on ITO-coated glass and the substrate
- C and P denote ceramic and polymer peaks, respectively

Dielectric properties



- dielectric constant of the composites increases with increasing PZT volume content, while loss ($\tan\delta$) is decreasing
- a strong frequency dependence of dielectric constant and $\tan\delta$ are measured for all composites

Conclusion

- composites of PVDF-TrFE and PZT with volume content up to 50 vol% ceramic have been produced by screen-printing
- structures down to 200 µm were printed, thickness was controlled by adjusting viscosity of the paste
- composites show a good distribution of ceramic particles in the polymer matrix
- dielectric constant increase with increasing PZT volume content, while dielectric loss decreases