

EuroEAP 2016

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Processing line for stacked DE-actuator modules

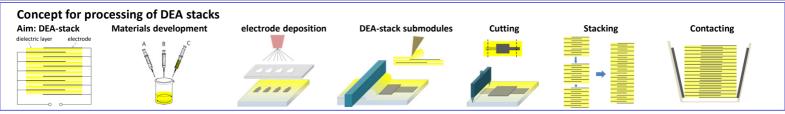
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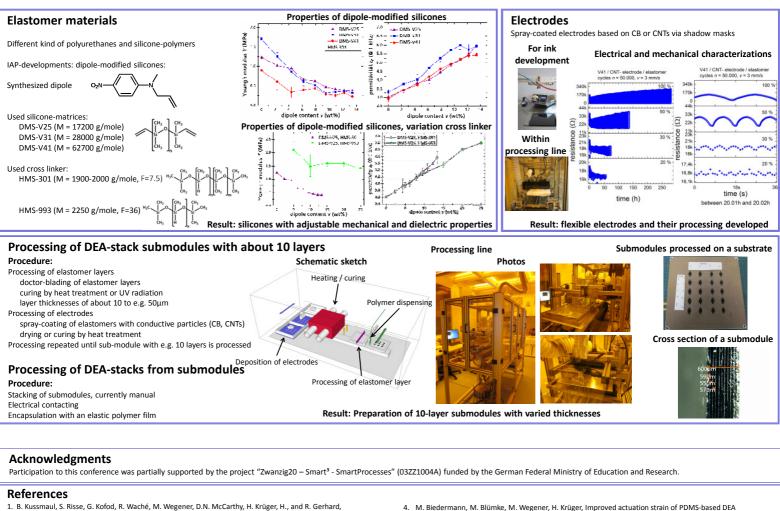
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Abstract

Dielectric elastomer actuators (DEAs) are widely studied due to their extraordinary properties. Research and development on DEAs is conducted in order to generate and optimize the elastomeric materials, flexible electrodes, preparation processes of films and layers as well as to build up film, roll and stacked actuators. A broad variety of applications is developed for different kind of actuators. Recently, huge developments were performed in stacked actuators. Such actuators consist of several tens or hundreds of single elastomer layers with flexible electrodes which are processed or aligned on top of each other. Actuator modules with heights of e.g. some millimeters to centimeters are fabricated which provide a deflection in transversal direction in the range of some hundred micrometers to e.g. some millimeters. Here, we present the manufacturing of stacked actuator modules which is performed in a semi-automatic processing line. The elastomeric layers are processed from the liquid phase by doctor-blading which allows the deposition of a homogeneous layer on a substrate with the size of 20cm x 20cm. In the next step the elastomer is cured by thermal or UV treatment. Carbon-particle electrodes are deposited by an air-brush technique. This procedure is repeated in order to process stacked actuator modules with e.g. 10 layers which can be combined to larger stacked actuators. Finally, stacked actuators were characterized regarding their geometrical and electrical properties.





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- B. Kussmaul, S. Risse, M. Wegener, G. Kofod, and H. Krüger, Matrix stiffness dependent electro-mechanical response of dipole grafted silicones, Smart Mat. Str. 21, 064005 (2012).
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Other EAP-related topics at Fraunhofer IAP

DEA/DOE

- Combination DEA / optical devices Piezo. polymer-ceramic composites
- Piezoelectric polymer foams Processing and characterization
- Processing and application of piezoelectric / ferroelectric polymers d characterization Piezoelectric table-tennis racquet Ultrasonic

Ultrasonic transducers

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6. M. Biedermann, M. Blümke, H. Krüger, M. Wegener, Crosslinkage of polymethylhydrosiloxanes utilizing a

diallyl functionalized nitroaniline derivative, Proc. SPIE, Vol. 9798, Article Number: 97981E (2016).