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Plasma techniques as enabler for customized MEMS-application

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MEMS (micro electro-mechanic systems) have found their way into many kinds of applications. Especially microsensors are used by each of us every day in products like cars and smartphones. These mass products are produced by the big companies in that area, whereas the focus of Hahn-Schickard is the development and the production of highly specialized MEMS products. This enables especially small and medium companies the access to the MEMS technology. The portfolio includes specific inertial sensors like gyroscopes or acceleration sensors for crash test dummies, microfluidic devices for biological and medical applications, actuators like micro valves used in space applications and unconventional high precision products like micromachined watch springs consisting of crystalline silicon. All these devices are manufactured in the cleanroom of the institute in volumes from single devices up to hundreds of thousands chips. In the final talk MEMS productions processes will be explained using recent projects. This includes plasma deposition processes like PE-CVD (plasma enhanced chemical vapor deposition) and sputtering as well as physical and chemical etching techniques. Whereas plasma deposition processes are used for metallic and dielectric thin films, plasma etching methods are used for both, thin films with isotropic etching processes like RIE (reactive ion etching) and for deep trenches highly anisotropic techniques like DRIE (deep reactive ion etching) with high aspect ratio up to 40. The high aspect ratio is achieved by periodically switching of etching and passivation of the sidewalls with a polymer. Finally, the multitude of application scenarios of these procedures will be demonstrated by a high variety of MEMS components realized by these plasma based production processes.

Keywords

MEMS

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