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Thin film solutions for MEMS and Sensors

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The coming “Internet of Things” (IoT) with its countless opportunities relies on the availability of thin film materials with precisely designed electrical, mechanical and chemical properties. Digging underneath the surface of the shiny IoT reveals a fascinating new reality of various technology combinations. Numerous types of substrates require process steps and coating of materials way beyond classic metallization of Si wafers. The ubiquitous combination of advanced functional materials and their layer stacks is the enabling technology for various sensors and actuators we find in every node connected to the IoT.

This presentation illustrates these needs using examples from different areas, where thin film systems enable the requested functions for MEMS and IoT. These encompass piezoelectric materials like AlN, AlScN or PZT for microphones and speakers, multilayer stacks that form soft magnetic cores for on-chip inductors and transformers, and last but not least, the integration of highly precise optical interference coatings using metals and dielectrics on 8” wafer level. These three examples with their respective challenges necessitate corresponding equipment concepts for volume manufacturing. Advanced stress control, prevention of cross-contamination, parallel processing or dynamic sputtering in batches will be explained. Specific features and options complete this overview, but not without pointing out to still existing challenges, which both device manufacturers and equipment providers have to overcome. We try to shed light on what is commonly known as “More-than-Moore” paradigm from the perspective of an equipment supplier, and for potential device manufacturers we will highlight criteria and requirements before entering and investing in these fascinating technologies.

Keywords

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Soft Magnetics

Optical Interference Coatings