SPTS
A KLA Company

APPLICATION
BRIEF

Low Temp CVD for MEMS

Introduction

Plasma Enhanced Chemical Vapor Deposition (PECVD) is commonly used in MEMS manufacturing for depositing thin dielectric films, typically at 350°C – 450°C. However, many MEMS contain materials such as polymers, magnetic layers or bonding adhesives, whose properties are degraded by high temperatures.

Examples include:

- Magnetic sensor passivation for magnetometers
- Anti-reflective coatings on polymer based micro-optics
- Via-last TSV dielectric isolation layers for MEMS wafer level packaging
- Bow compensation layers for thinned silicon

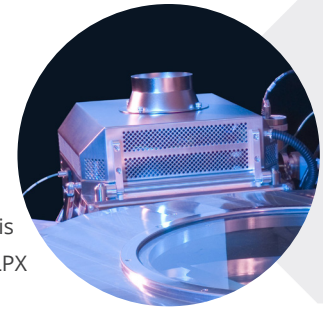
In such cases, the manufacturing process must be tailored to maintain a thermal threshold typically <200°C to avoid degrading device performance and lowering yield.

Low Temperature PECVD

By re-engineering system hardware and processes, uniform and stable SiN and SiO films have been produced at deposition temperatures as low as 100°C.

SiN and SiO films can also be deposited sequentially in the same process chamber.

This low temperature PECVD capability is available on SPTS's Delta™ *f*xP, c2L and LPX wafer handling plaforms.



SPTS's APM PECVD process module

Active Temperature Control

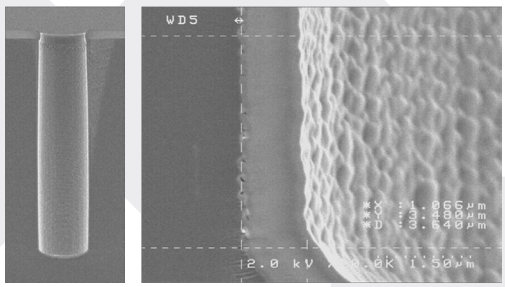
Active platen cooling in the PECVD chamber allows low temperature control while enabling high deposition and chamber clean rates – critical for high volume productivity.

Optional Degas Module

For MEMS structures which include polyimide or other polymeric materials, it may be necessary to include a degas step prior to PECVD, as outgassing of these materials can affect the plasma during deposition and reduce final film quality. SPTS offers an integrated degas chamber for degassing and preventing re-exposure to atmosphere prior to deposition.

Film Quality

SPTS's optimized low temperature PECVD processes produce SiO and SiN films with unrivalled stability and electrical isolation performance. Wafer-to-wafer thickness non-uniformity can be controlled to <1%. Both tensile and compressive film stresses can be produced, with stresses controllable to ±5MPa wafer to wafer, a significant benefit when working with the fragile structures used in modern MEMS devices. With a range of films already proven in high volume manufacturing, SPTS leads the way in low temperature PECVD technology.



PE-TEOS oxide liner coating surface of high aspect ratio via

SPTS Technologies, a KLA company, designs, manufactures, sells, and supports etch, PVD, CVD and MVD® wafer processing solutions for the MEMS and sensors, advanced packaging, photonics, high speed RF, and power device markets. For more information, email enquiries@spts.com or visit www.spts.com