



# APPLICATION BRIEF

# LPCVD SiN for MEMS

## Introduction

Low stress SiN is used in the manufacturing of MEMS devices as a structural material or an etch stop layer for the patterning of critical mechanical features. High and non-uniform stresses in the SiN film can cause undesirable deformation of the MEMS structures after release.

Plasma Enhanced Chemical Vapor Deposition (PECVD) SiN is used for all applications which require a low (<400°C) deposition temperature, but where low deposition temperature is not a requirement, Low Pressure Chemical Vapor Deposition (LPCVD) SiN provides a less expensive alternative that delivers a film with a lower etch rate than the traditional PECVD.

## LPCVD Batch Processing

LPCVD is a thermal batch process that deposits various films at low pressure.

In conventional LPCVD furnaces, gas depletion during the reaction causes variable film stress, which limits the viable batch size and reduces productivity. However, SPT has developed a cost effective, low stress LPCVD SiN process that combines the excellent stress control and process repeatability of a PECVD process together with the benefits of low wet etch rate and low ownership cost of an LPCVD system.



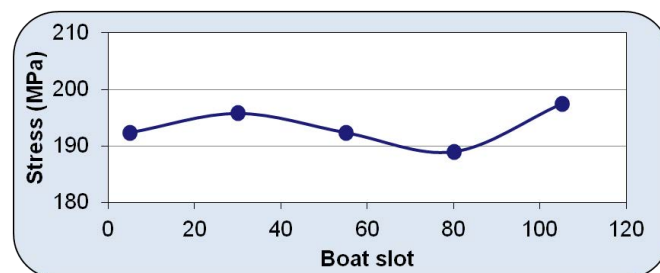
SPT's AVP LPCVD system

## Low Stress SiN Benefits

Key benefits of using SPTs' low stress LPCVD SiN process:

- 3x reduction in CoO vs. competing LPCVD furnaces
- 5x increase in productivity, from tight control across entire 100 wafer batch
- ±10MPa stress control of tensile and compressive films across a 100 wafer batch
- >5x higher SiO<sub>2</sub>: SiN selectivity in Primaxx HF vapor release etch, compared to traditional LPCVD
- Run 150mm and 200 mm wafers simultaneously with no hardware changes
- Compatible with perforated, bonded and ultra-thin substrates
- Available as an upgrade to existing AVP/RVP systems
- Compatible with in-situ clean

## Stress Control



Stress control ±10MPa for batch of 100 wafers

## High Productivity

In addition to the inherent advantages of batch processing, throughput and productivity have been improved by using in-situ cleaning and increasing MTBC >30µm.