

## Novel Method for *In-Situ* Monitoring of Thickness of Silicon Wafer during Wet Etching

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In this investigation, we developed a plate wave sensor made on a Li-doped ZnO piezoelectric film for monitoring the thickness of a silicon membrane in real-time during wet etching. A novel method, which differs from any presented in previous work on etch-stop techniques, is developed to monitor *in-situ* the thickness of a silicon membrane during wet etching. In this work, in which the design wavelength of the interdigital transducers (IDT) is 40  $\mu\text{m}$ , the method presented for measuring the thickness of a silicon membrane from 20  $\mu\text{m}$  to 40  $\mu\text{m}$  in real-time is highly accurate and simple to implement. Base on the same methodology, the proposed plate wave sensor also allows the thickness of a silicon membrane to be monitored from a few  $\mu\text{m}$  to hundreds of  $\mu\text{m}$  *in-situ*, depending on the periodicity of the IDT. The principles of the method, the detailed fabrication flow, the set-up for monitoring the thickness and the simulation and experimental results are all addressed. The theoretical and measured values differ by an error of less than 1.50  $\mu\text{m}$  and are very close to each other.

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