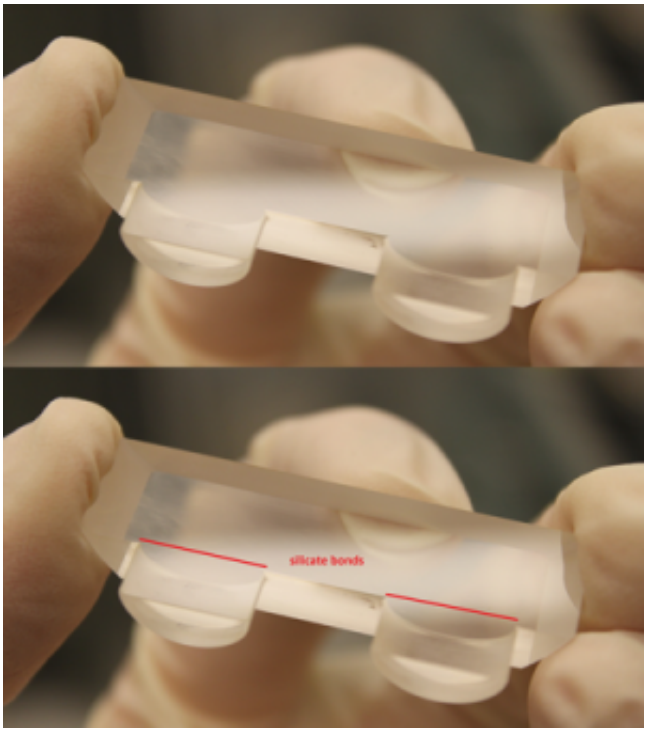
Thin, strong bond for vacuum seal

December 3 2014, by Patrick Egan



Silicate bonds are so thin they are transparent.

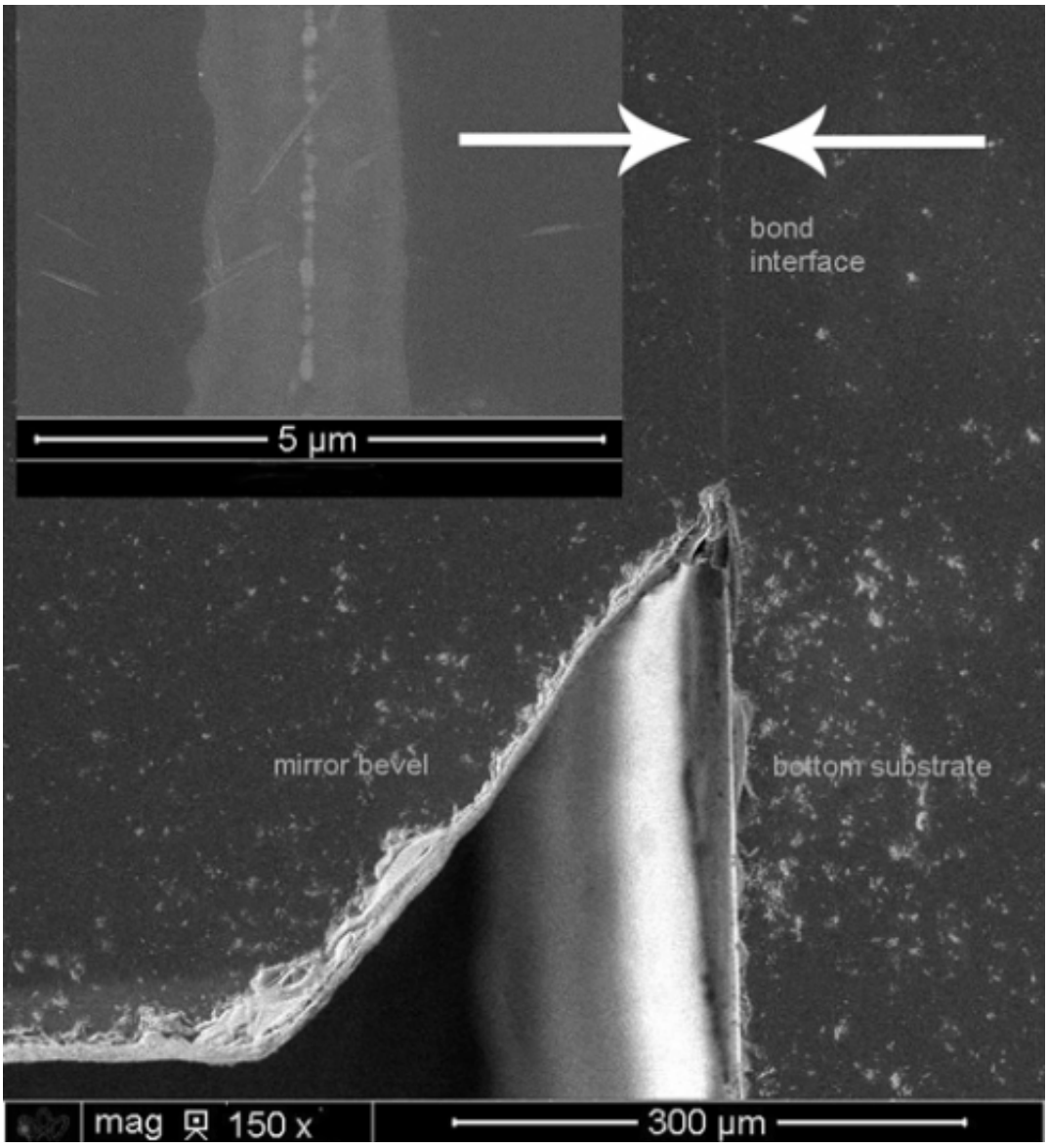
An ultra-stable, ultra-thin bonding technology has been adapted by researchers in PML's Semiconductor and Dimensional Metrology Division for use as a super-strong vacuum seal.

Though it is less than 100 nanometers thick, the bond can withstand pressure up to 2 megapascals (almost 300 pounds per square inch), and its drift, or how much it shifts over time, is on the order of less than 3 trillionths of a meter per hour.

The method, called silicate bonding, had previously used by other experiments to affix optical materials to one another but its use as a vacuum seal had not been attempted to the researchers' knowledge.

The team used the technique for their recent prototype of the first photonic pressure sensor, a device that outperformed the present standard, a 3-meter-tall mercury-based device, in resolution, speed, and range at a fraction of the size.

Several industry representatives have already shown interest in the prototype pressure sensor, which could be used for semiconductor, glass, and aerospace manufacturing.



A scanning electron micrograph (SEM) of a silicate bond reveals that it is less than 100 billionths of a meter thick.

Provided by National Institute of Standards and Technology

Citation: Thin, strong bond for vacuum seal (2014, December 3) retrieved 20 March 2024 from

https://phys.org/news/2014-12-thin-strong-bond-vacuum.html