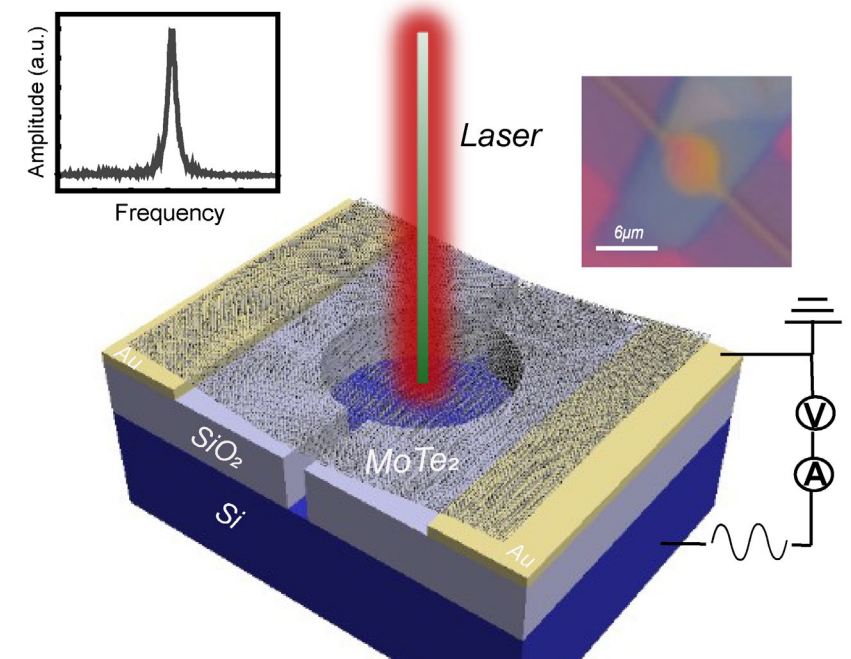


Strain refers to changing the shape of an object with force, for example by stretching or bending it. Atomically-thin materials can change shape enormously without breaking, but precisely measuring the strain is very difficult because the membranes are very delicate and produce weak signals because they are extremely thin.

Researchers in the Wisconsin MRSEC have developed a nanomechanical resonator device to measure strain in thin membranes. It uses laser interferometry to measure how much the membrane moves when it vibrates, then scans the vibration frequency to find the largest response, called resonance. This new method can measure changes in the membrane size as small as 0.01%.

This device is important because applying strain to magnetic membranes can control their magnetism, offering a new way to tune their properties for advanced technologies. For example, strain tuning magnetism may enable energy-efficient data storage through manipulation of magnetic states without the need for power-hungry magnetic fields, and it may improve highly sensitive magnetic field sensors used in medical diagnostics, navigation systems, and quantum computing. Measuring strain is a crucial first step to these advances.



Wisconsin MRSEC researchers have developed a nanomechanical resonator to measure strain in membranes as thin as a few atoms. The strain is measured through shifts in the resonator's resonance frequency, which is detected using laser interferometry.