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Novel high bandwidth wall shear stress sensor for ultrasonic cleaning applications[1] S. ROBERTO GONZALEZ-AVILA, FIRDAUS PRABOWO, Nanyang Technological University, CLAUS-DIETER OHL, Nanyang Technologcial University — Ultrasonic cleaning is due to the action of cavitation bubbles. The details of the cleaning mechanisms are not revealed or confirmed experimentally, yet several studies suggest that the wall shear stresses generated are very high, i.e. of the order of several thousand Pascal. Ultrasonic cleaning applications span a wide range from semiconductor manufacturing, to low pressure membrane cleaning, and the in the medical field cleaning of surgical instruments. We have developed a novel sensor to monitor and quantify cleaning activity which is (1) very sturdy, (2) has a high bandwidth of several megahertz, (3) is cheap in manufacturing costs, and (4) of very small size. We analyze the sensor signal by comparing its response time correlated to single laser induced cavitation bubbles using high-speed photography. Additionally, we will present first measurements in ultrasonic cleaning bathes using again high-speed photography. A preliminary discussion on the working mechanism of the sensor will be presented.

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