OPOTEK Inc.
Tunable Laser Systems

Particle Image Velocimetry (PIV)

INFRARED DIAGNOSTICS FOR MEASURING FLUID AND SOLID MOTION INSIDE SILICON MICRODEVICES

A new velocimetry system has been developed for use in microdevices that incorporate silicon as their structural material. The system is designed to illuminate and measure particle and surface motions using infrared wavelengths, taking advantage of the fact that silicon is largely transmissive to light with wavelength above 1 μm. The system allows the observation of motion inside silicon-based microdevices, which are otherwise opaque to light at visible wavelengths. By analyzing these images using both time-of-flight and phaselocked techniques, quantitative measurements are demonstrated concerning the position and speed of internal surfaces and the motion of fluids inside complex microfabricated devices. The system as demonstrated has a resolution of approximately 360 nm, although higher resolution is possible with future improvements.

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