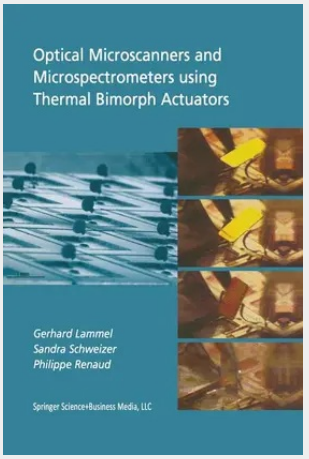
Lammel / Schweizer / Renaud

Optical Microscanners and Microspectrometers Using Thermal Bimorph Actuators



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Optical Microscanners and Microspectrometers using Thermal Bimorph Actuators shows how to design and fabricate optical microsystems using innovative technologies and and original architectures. A barcode scanner, laser projection mirror and a microspectrometer are explained in detail, starting from the system conception, discussing simulations, choice of cleanroom technologies, design, fabrication, device test, packaging all the way to the system assembly.

An advanced microscanning device capable of one- and two-dimensional scanning can be integrated in a compact barcode scanning system composed of a laser diode and adapted optics. The original design of the microscanner combines efficiently the miniaturized thermal mechanical actuator and the reflecting mirror, providing a one-dimensional scanning or an unique combination of two movements, depending on the geometry. The simplicity of the device makes it a competitive component.

The authors rethink the design of a miniaturized optical device and find a compact solution for a microspectrometer, based on a tunable filter and a single pixel detector. A porous silicon technology combines efficiently the optical filter function with a thermal mechanical actuator on chip. The methodology for design and process calibration are discussed in detail. The device is the core component of an infrared gas spectrometer.

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