Docket #: S13-036

Method for Fabrication of Arrayed Dual Axis Microscopes

Precision in surgical removal of cancer is guided by pathological assessment of resected tissues, and there is a dire need to reduce the time and distance between the critical diagnostic events and the surgical procedure. Stanford researchers have proposed to develop tools that reveal histopathology with cellular resolution, and eventually molecular specificity, on fresh resected tissues that can be used on the cutting bench in the surgical pathology suite. The core technology is a series of arrayed miniaturized confocal microscopes that allow rapid examination of tissue margins to guide the pathologist and inform the surgeon ensuring complete removal of the cancer and preservation of normal tissue. In the future, this process could eliminate the histology lab from evaluation of most specimens leading to a significant savings in time and cost.

Figure

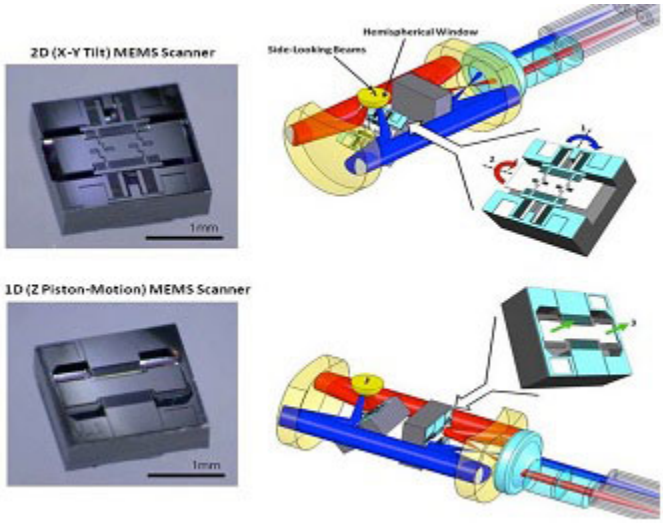

Figure description - Forming a 3-D scanning mechanism using two different types of MEMS scanners in our side-looking DAC microendoscopes. A biaxial scanner provides x-y transverse scanning, while the uniaxial scanner provides axial (z) scanning of the beams.

Stage of Research

- Successfully built several 10-mm- and 5-mm-diameter handheld and endoscopic DAC microscope systems operating at 488, 560, 785, or 1310-nm wavelengths.
- The present generation 3.8 mm diameter microscope design extends beyond all previous confocal microscopes, with smaller size, multispectral capabilities, greater signal to noise, dynamic x, y and z- scanning, self-aligning capabilities, higher resolution, and a simpler, more robust modular construction that can readily be integrated into other modalities.

Applications

- Pathological assessment of tumor margins
- Evaluating live 2D and 3D cell, tissue, and organ cultures on a cellular and sub-cellular level
- Smaller DAC microscopes can be implantable/wearable in vivo microscopes for use in humans or animals for biomedical diagnostics

Advantages

- Rapid, microscopic inspection of large surface areas of resected tissue
- Reduces the time and distance between the critical diagnostic events and the surgical procedure
- Improves patient care by advancing point-of-care pathology
- High-resolution, high-speed digital image capture and sophisticated image-processing algorithms
- **Innovative design:**
    - Single monolithic device can be made in a few fabrication and assembly steps at the wafer level
    - Small footprint, size of tablet computer, with 10 sq. centimeter window for quick sample placement

Patents

- Published Application: 20140268318

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