Micro-devices and optics for applications in sensing, imaging and energy conversion

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In this talk, recent research done by my group in (1) miniaturized mass analyzer, (2) bioinspired micro-optics and imaging and (3) energy conversion will be presented.

Mass analyzer based on quadrupole ion trap has been successfully integrated with optics, providing a novel way to measure optical properties of trapped ions and charged particles. The operating principle, scaling parameters and performance of these new devices will be discussed. The study of scarab beetles has led to the design and fabrication of micro-waveplate and polarizers using polymer liquid crystal. This technology has been successfully applied to the construction of linear and full Stokes imaging polarimeters that operate in the visible spectrum. Finally, several approaches for solar energy conversion to fuel are demonstrated using a combination of photovoltaic cell, semiconductor laser and micro-fabricated chemical reactor.

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