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Electrostatically-Addressed MEMS Array System And Method of Use

Researchers at the University of South Florida have developed a modification to the present mechanical composition of optical spectrometers. This modification allows for the separation and analysis of specified wavelengths that are non-contiguous.

Existing spectrometers measure light at any given time, as either one wavelength, or as a small range of wavelengths, making it impractical to rapidly or precisely measure two or more wavelengths that are not adjacent to one another.

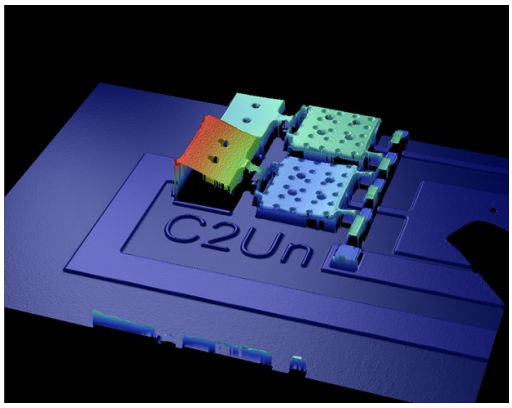
Our inventors have modified the current technology by devising MEMS enabled mirror arrays that uses a flexible hinge and fulcrum point design. The mirror arrays pops-up in order to reflect the desired wavelengths, even if they are noncontiguous, in order for them to be analyzed. Within this modification of the commonly used spectrometer, our inventors have also implemented a technology that is used to control the MEMS fabricated micromirror arrays.

Instead of using hundreds to thousands of drive signals to control the micromirror arrays, our inventors have introduced a multiplexing method that uses only a few electrical inputs, and minimal voltage to control every mirror. Essentially three main electrodes have the ability to hold any one of the mirrors out of plane, or keep that mirror held down and deactivated. In a 1,000 mirror array broken into a 10x10 coordinate system, only twenty-one leads would be needed to control each individual mirror, instead of requiring 1,000, which is the current requirement.

ADVANTAGES:

- **Spatial separation of wanted and unwanted portions of output spectra**
- **Achieves mirror actuation with only a few electrical inputs**
- **Small electrostatic movement and large mechanical movement of MEMS mirror arrays**

Output spectra separated using flexible hinged MEMS mirror arrays



Pop-up mechanism with anchored fulcrum. The flexible hinged design reduces the pull-in voltage, while allowing spatial separation of wanted and unwanted portions of the output spectra.

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