



Contribution ID: 984

Type: **Oral (Non-Student) / orale (non-étudiant)**

A 16-Microcantilever Array Sensing System for the Rapid and Simultaneous Detection of Analyte

Thursday, 16 June 2016 13:30 (15 minutes)

A new 16 microcantilever sensor system for performing sensing experiments in liquid or gas will be presented. The system uses two 8-microcantilever arrays held in a sensor cell. The microcantilever deflections are monitored by oscillating two focused optical beams over the microcantilevers such that only one microcantilever is illuminated at one time and each microcantilever is illuminated approximately once per second. The optical beams are moved using a motorized translation stage. The reflected optical beams are detected by a two-axis photo-sensitive detector (PSD) producing a series of two eight peak shaped patterns. The raw data from both the PSD and the translation stage are used to fold the peak shaped patterns from each array one on top of the other so that the deflection of the cantilevers can be obtained from the change in height of each peak. The stability of the data was found to be dependent on the speed of the translation stage. When the translation stage was operated between 0.5 and 1 mm/s, the deflection of each microcantilever in units of surface stress was found to be highly reproducible and consistent between arrays. The system was used to detect Ca^{2+} , Sr^{2+} and Cs^+ ions using different calix[4]arene-based sensing layers. The results obtained were found to be reproducible and completely consistent with results obtained using a typical two single microcantilever sensor system.

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Session Classification: R2-6 General Instrumentation II (DIMP) / Physique générale des instruments II (DPIM)

Track Classification: Instrumentation and Measurement Physics / Physique des instruments et mesures (DIMP-DPIM)