Non-technical Highlights

Versatile and affordable miniature detector for environmental and biological samples

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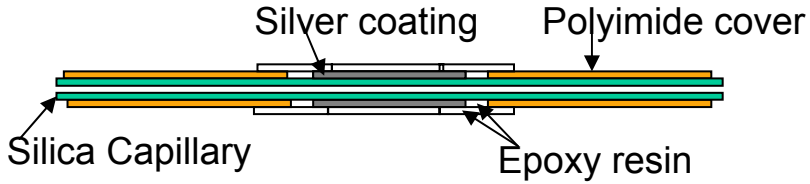
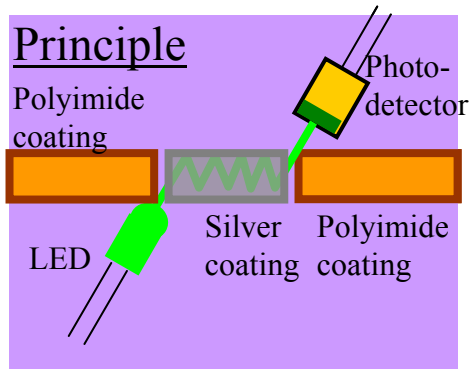
There are ongoing needs to analyze very small amounts of sample (from nanogram to femtogram level) in proteomics, genomics, forensics and even determining metals in air particles. Miniature separation and detection techniques are needed that can do the analysis quickly with minimum chemical consumption. We focus on miniature 'capillary scale' separation and detection systems for trace analytes.

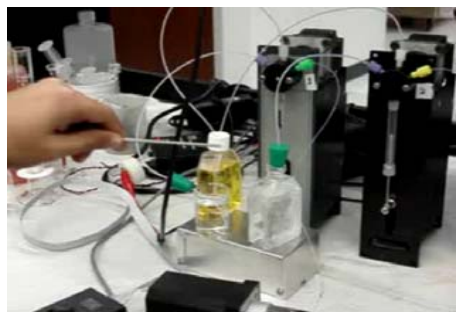
The measurement of ultraviolet and visible light forms the basis of the most common detection technique in analytical chemistry. We show a detector spanning from the near infrared to the near UV, fabricated with 0.18 mm bore tubes for measuring analytes which absorb light either inherently or after derivatization. This detector is 50x more sensitive than its predecessors. It uses a readily changeable light emitting diode as the light source and a high sensitivity photodiode, as the light is propagated through a reflective enclosure. This multi-reflection capillary absorbance detector was capable of measuring low picogram quantities of a dye in the presence of large amounts of salt or other non-absorbing substances. This miniature detector is intended for capillary ion chromatography technique.

The video clip of the slide shows the generated signal when a low concentration sample is passed through the capillary multi-reflection absorbance detector. (Credit: Santosh Mishra)

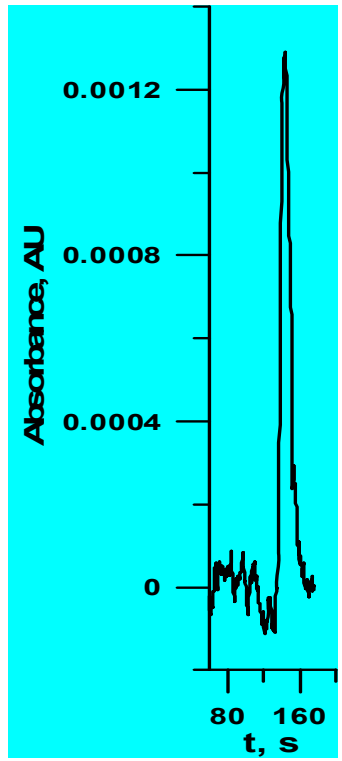
Capillary flow-through cell







Click on photo to start video



Santosh K Mishra and Purnendu K Dasgupta, "Capillary scale light emitting diode based multi-reflection absorbance detector", Analytica Chimica Acta, 605 (2), 166-174 (2007)