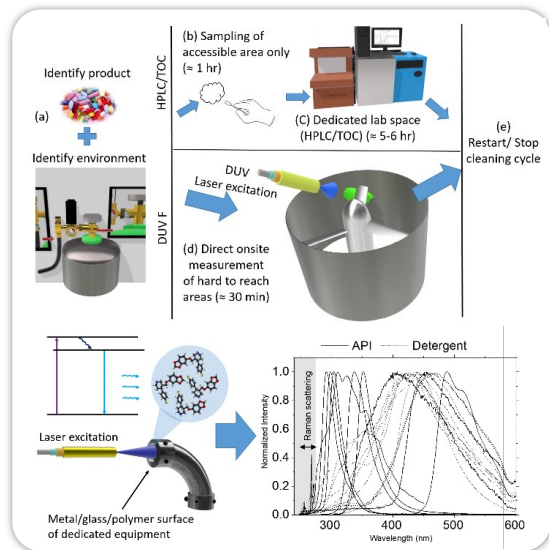


Pharmaceutical Cleaning Verification using Deep UV Laser Induced Fluorescence Spectroscopy (DUV-LIFS)

Cleaning verification and validation is a requirement in the pharmaceutical industry. Due to the limited number of mobile devices that do effective and accurate onsite cleaning verification, it is mostly done via lab-based quality control techniques. These techniques, such as high-performance liquid chromatography (HPLC) or total organic carbon, often lead to extending the validation of the cleaning by days. The void of more sensitive, accurate, and portable instruments to verify cleaning onsite has to be filled. The use of deep ultra violet (DUV) laser – induced fluorescence for detecting carryover of active pharmaceutical ingredients (APIs) and detergents onsite is a novel technique introduced by CAPPA. The specificity of the technique allows API traces having concentrations as low as $\approx 0.20 \mu\text{g}/\text{cm}^2$ to be identified within a very short amount of time, even if the API to be detected has a low fluorescence efficiency.

DUV – LIF for Cleaning Validation in Hard to Reach Areas

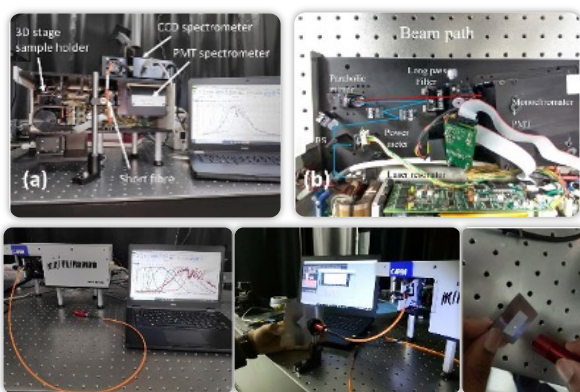
Deep UV LIF set up in CAPPA provides a combined Raman and fluorescence spectra measurement with improved detection limits. DUV laser-induced fluorescence of trace API over any polymer/glass substrate has better signal to background ratio (SBR) compared to FTIR absorption techniques. Processing times of DUV laser-induced fluorescence trace detection are shown to be much less than swab based methods.



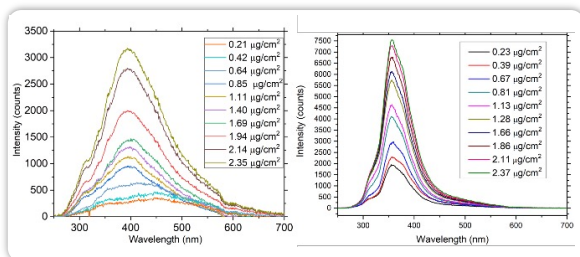
Industry Impact

- Help identify difficult to clean areas
- Simultaneous multi-component detection
- Reduced production downtime from days to hours
- Improved sample response times prevent a measurement backlog

Initial Instrument Design



Lower Limits of Detection than other Spectroscopic Methods



Higher Chemical Specificity

