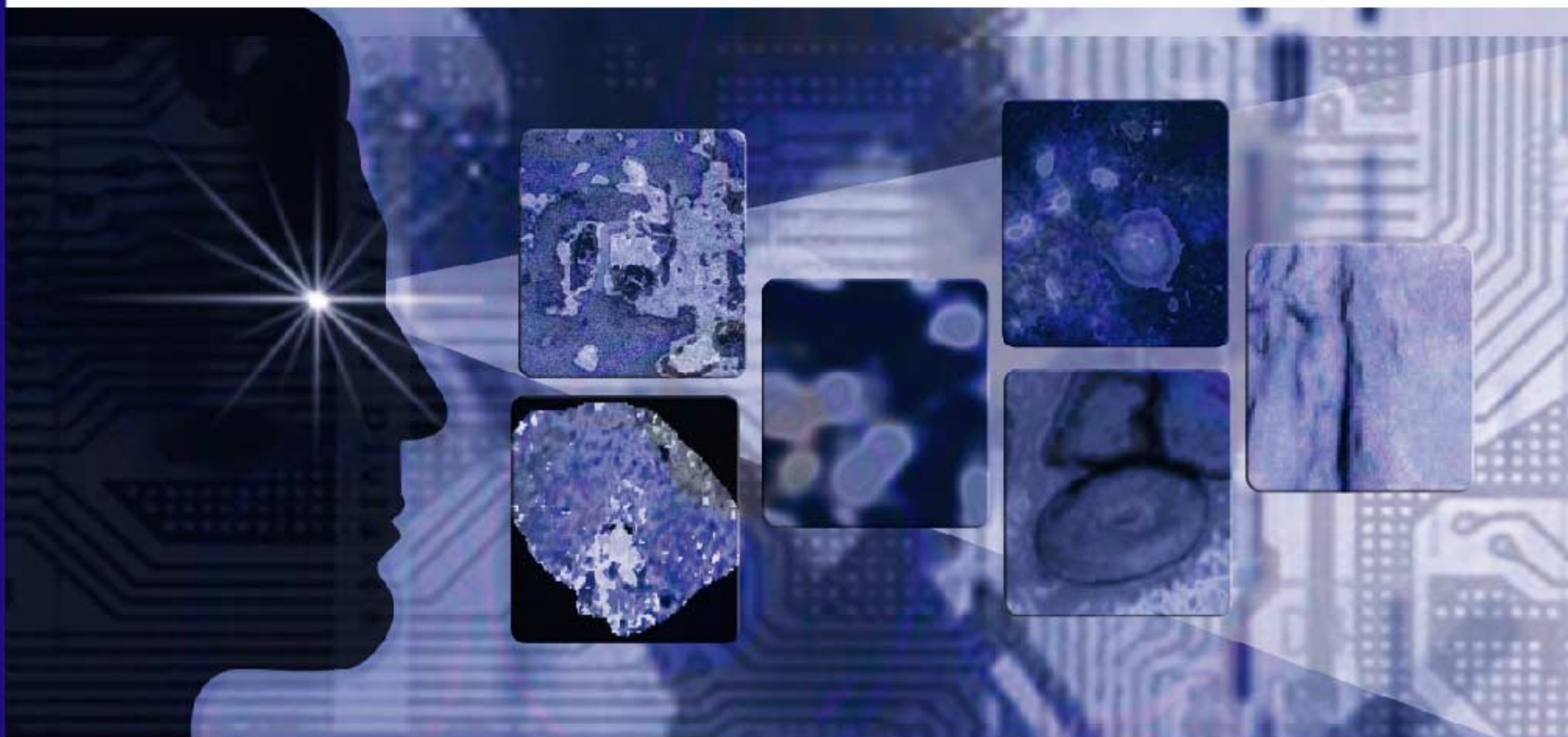




Revolutionizing *your concept of*
Molecular Chemical Imaging



Our mission _____

Enabling and Revolutionizing as a World Leader
in Molecular Chemical Imaging Technology



Validation of the CI Print Macroscopic Chemical Imaging System for the Analysis of Latent Fingerprints

Rebecca Schuler,* BS, Tammy Powers, BS, Paul Johns, Undergraduate, Patrick Treado, PhD
ChemImage Corporation

*schuler@chemimage .com
www.chemimage.com
412-241-7335 ext. 208

Outline

- Chemical Imaging Overview and Technology
- Chemical Imaging of Fingerprints using the CI PRINT™
 - Introduction
 - Instruments
 - Methods
 - Results/Comparisons
- Conclusions

WHY WILL CHEMICAL IMAGING BE IMPORTANT IN FORENSIC SCIENCE?

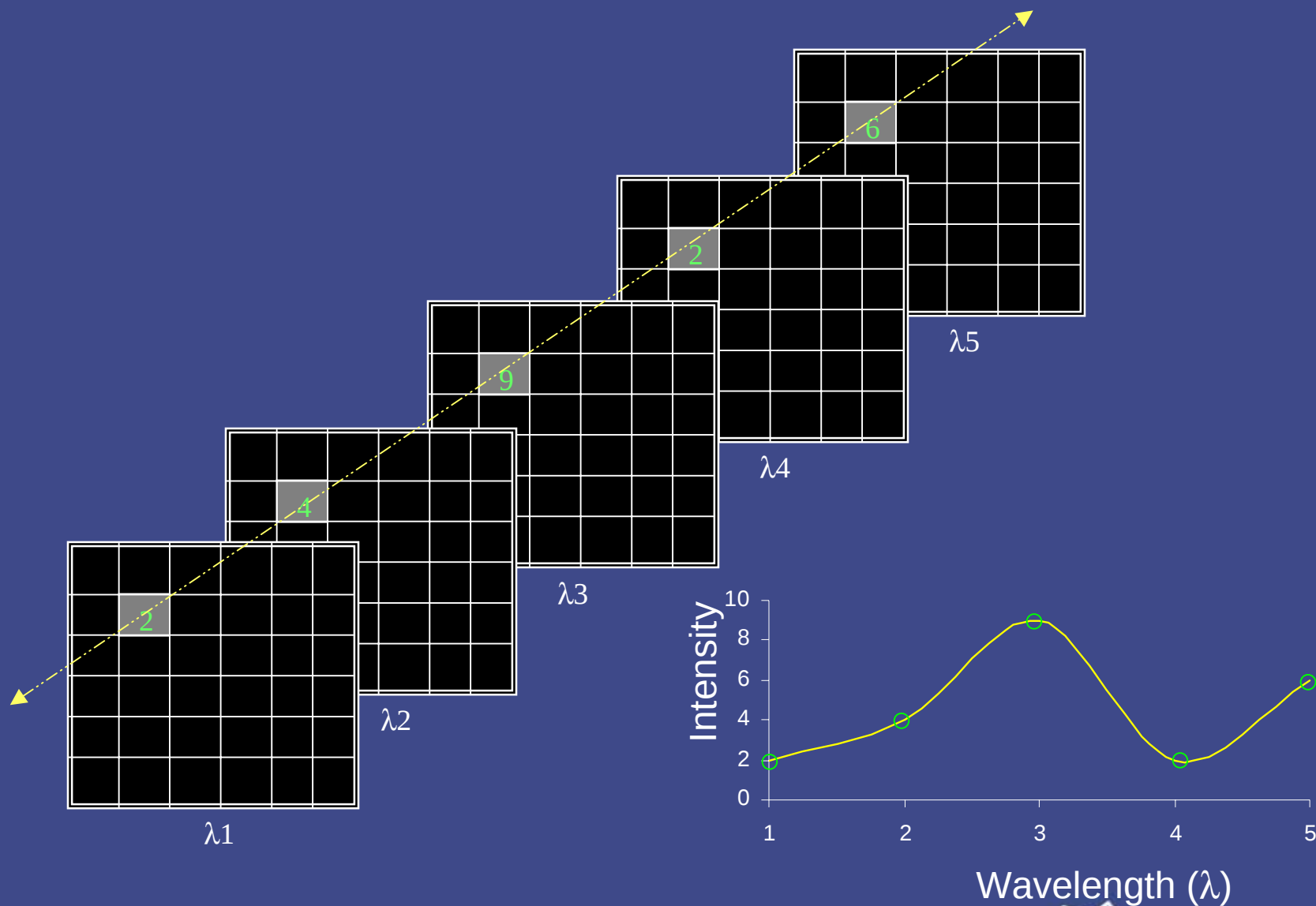
- Need for rapid, objective discriminating techniques
- Allows image processing for enhanced substrate to sample contrast
- Side-by-side macroscopic / chemical comparison
- Uses well understood optical and spectroscopy methods
- Nondestructive & noncontact
- Little to no sample preparation required

FORENSICS APPLICATIONS

- *Latent Fingerprints*
- *Fibers*
- *Questioned Documents*
- *Paint*
- *Tape*
- *Drugs & Explosives*
- *Condom Lubricant Identification*
- *Powder Identification*

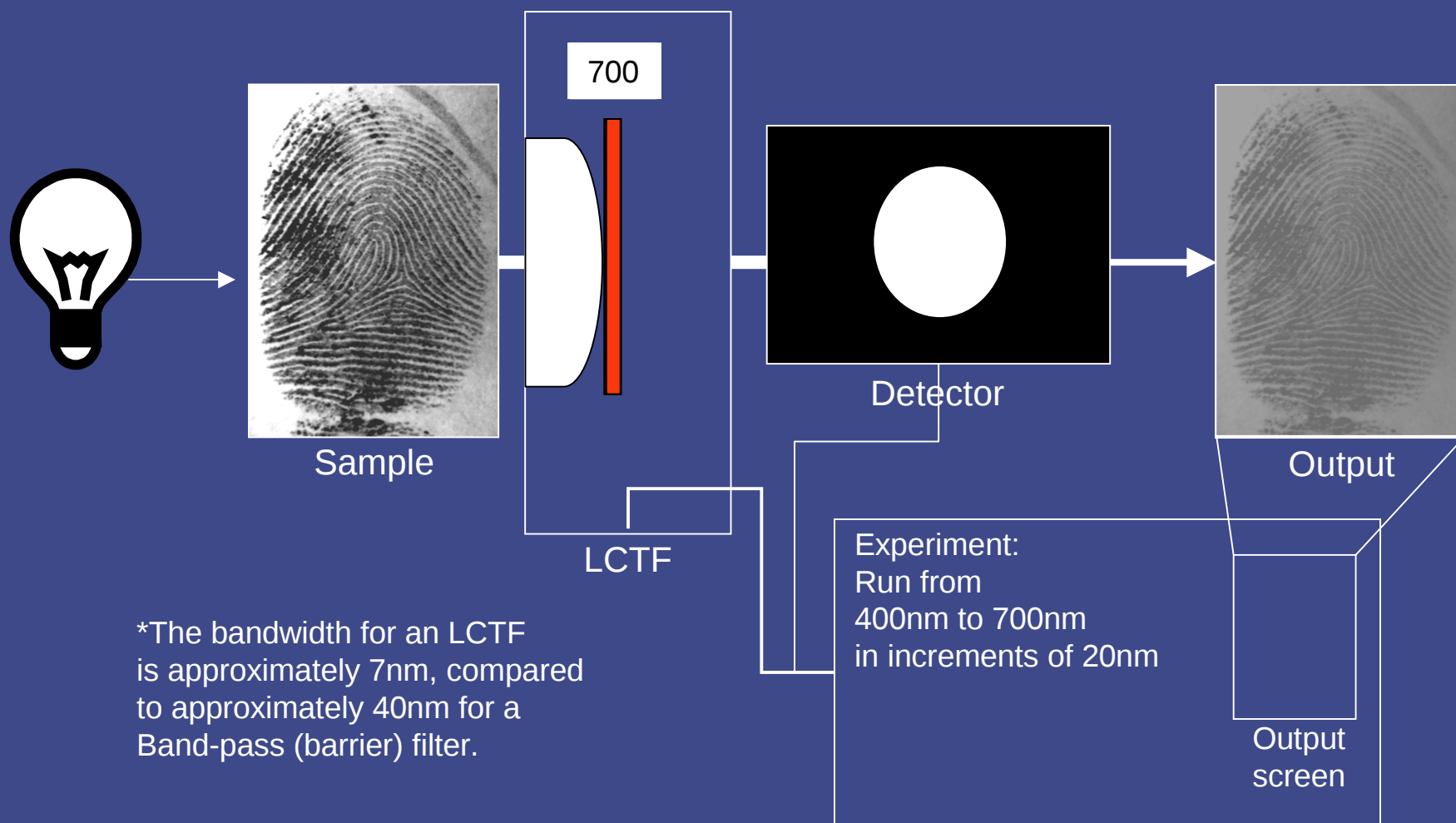
Chemical Imaging

Molecular spectroscopy and digital imaging for analysis of materials



How Does Chemical Imaging Technology Work?

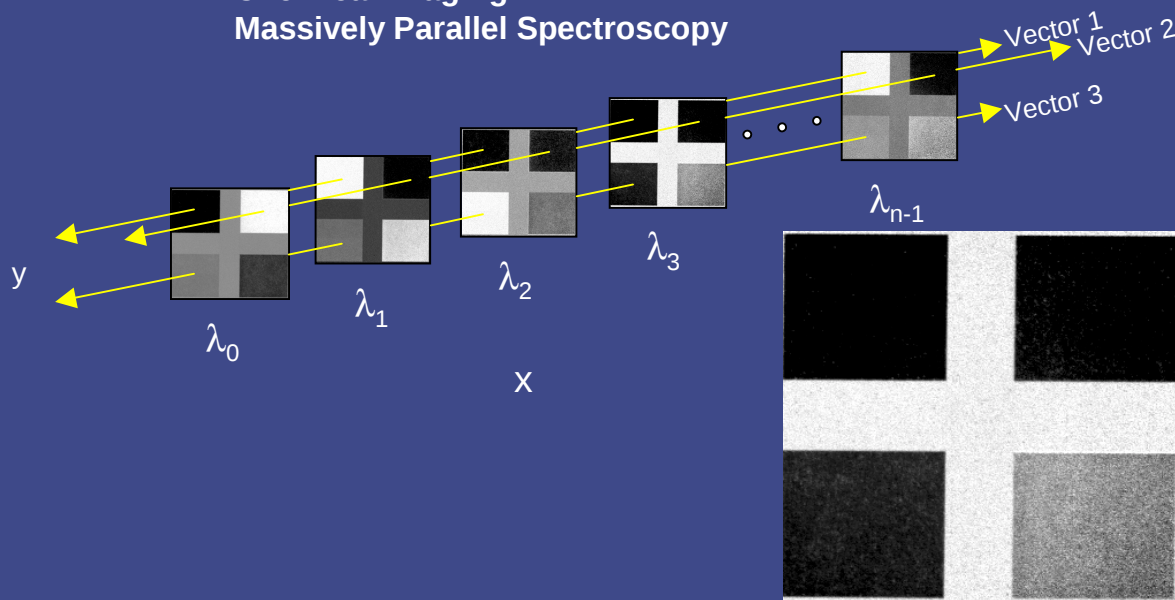
When set to a particular wavelength an LCTF* acts as a band-pass filter in the same way a barrier filter works. However, an LCTF has no moveable parts, is computer controlled and can be set to any wavelength in the visible region. It can also be set up to change wavelengths for multiple image collections.



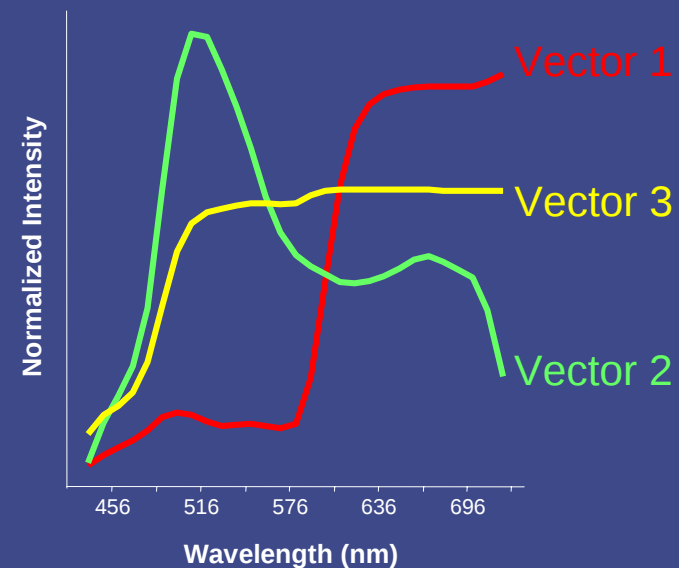
Color Chart Image



Chemical Imaging Massively Parallel Spectroscopy



Visible Reflectance Spectra

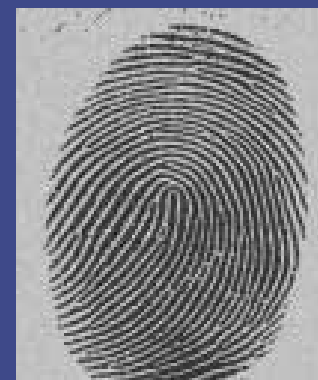


[Click Here](#)

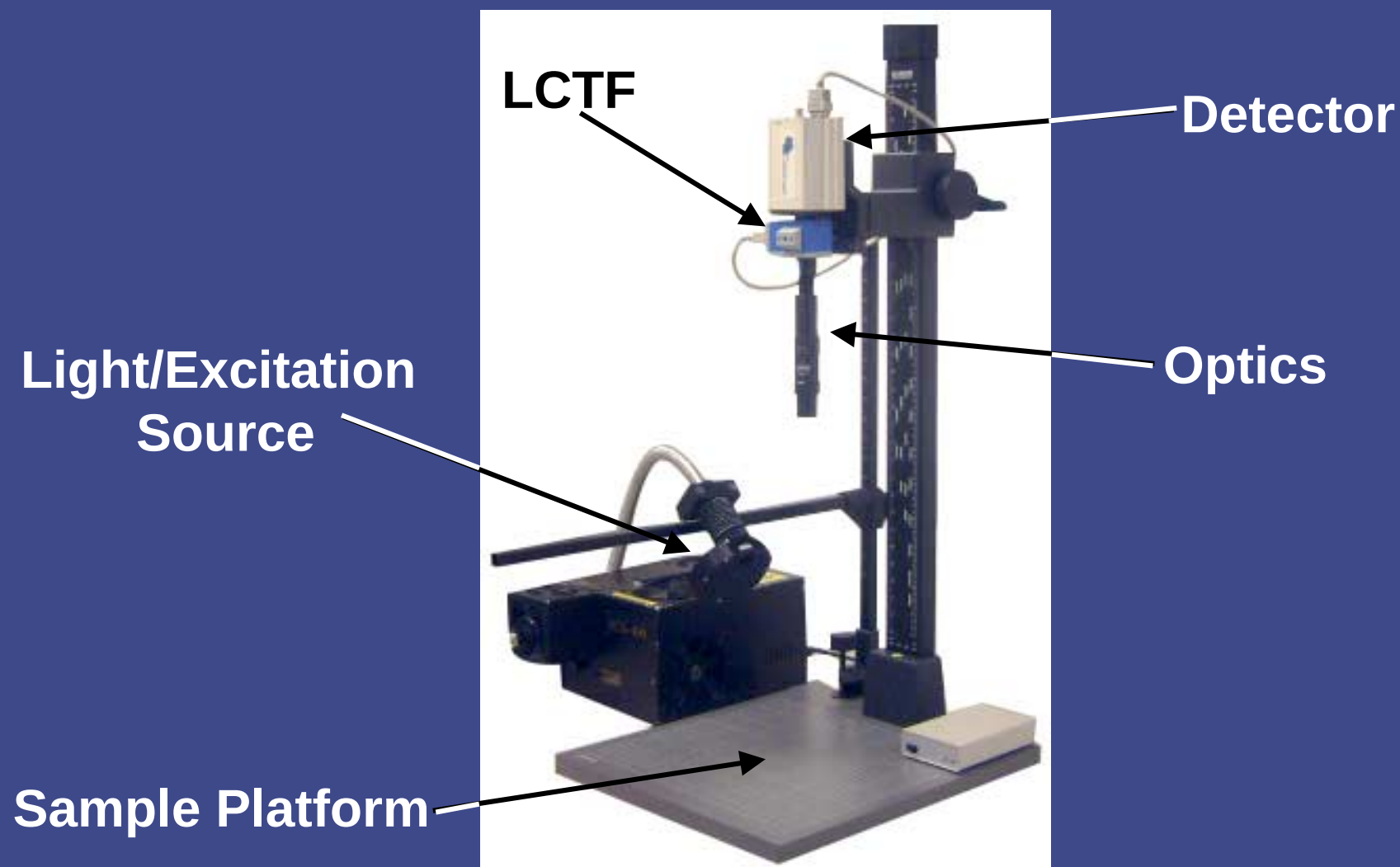
Introduction



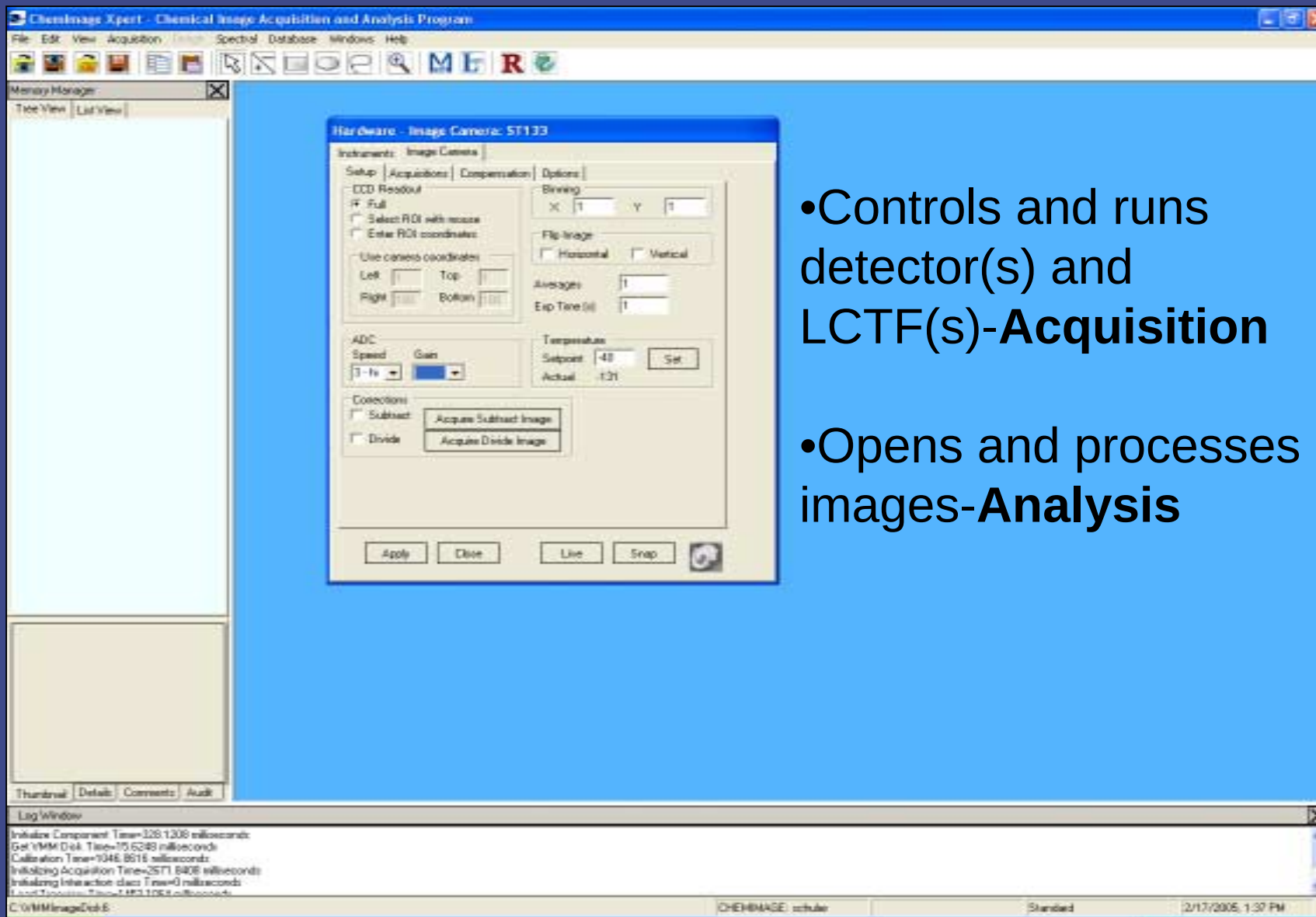
Develop and validate a cost effective macroscopic Chemical Imaging system for latent fingerprint analysis



CI PRINT™ Macroscopic Chemical Imaging System



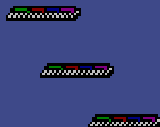
ChemImage Expert™ Chemical Imaging Software



- Controls and runs detector(s) and LCTF(s)-**Acquisition**

- Opens and processes images-**Analysis**

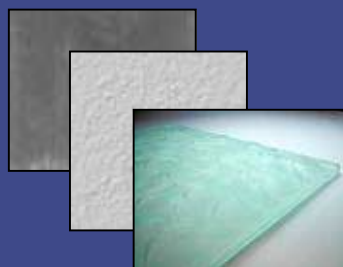
Methods



Reproducibility Studies



Age Degradation Studies



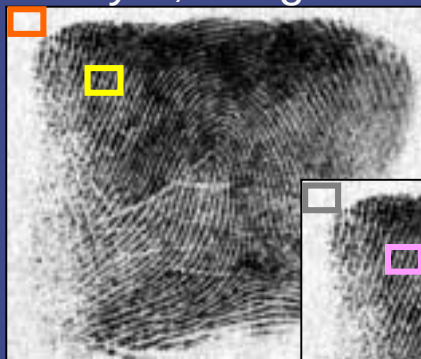
Substrate Variation Studies



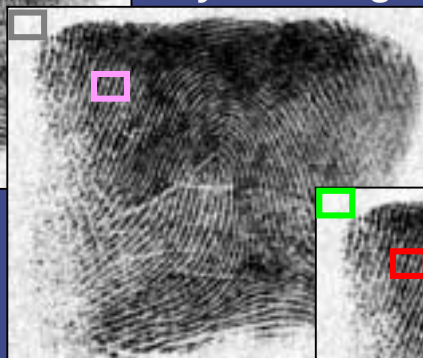
Chemical Treatment Variation Studies

Reproducibility

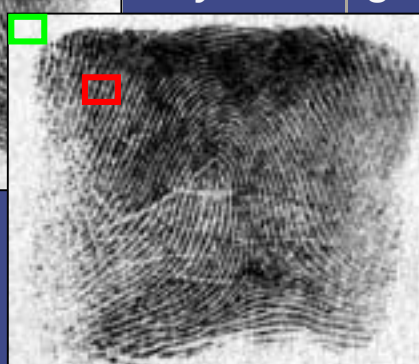
Day 1, Image 2



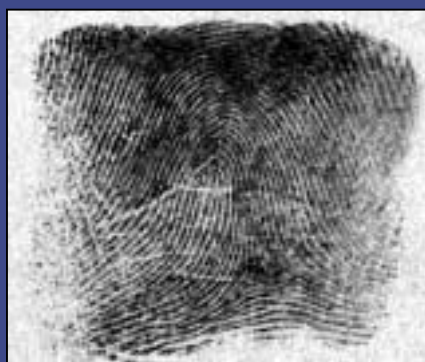
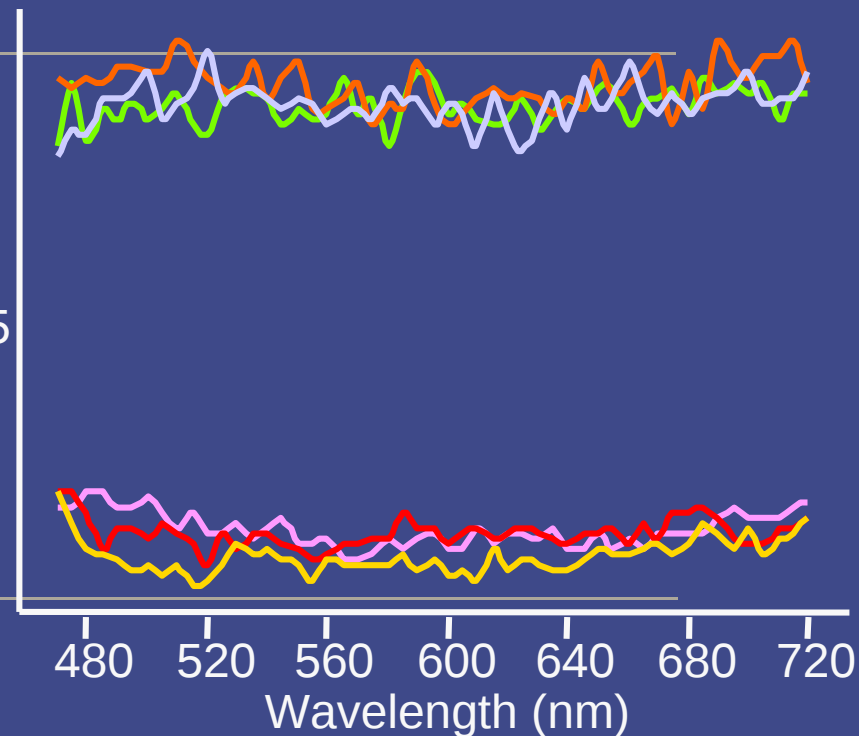
Day 3, Image 2



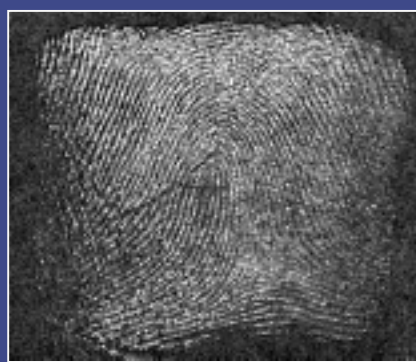
Day 3, Image 5



Background Divided
520nm Extract



Zero Offset, 520nm Extract



Normalized, 520nm Extract



PCA Extract 1



Age Degradation

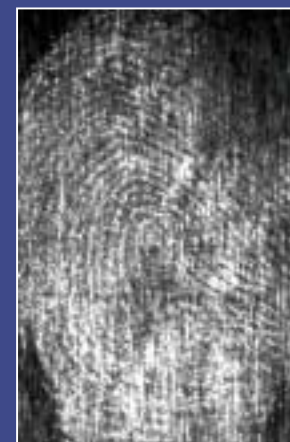
Metal Substrate, No Treatment



1 day



1 week



8 weeks

Paper Substrate, DFO Treatment



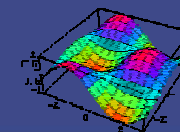
1 day



1 week

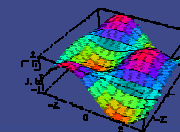
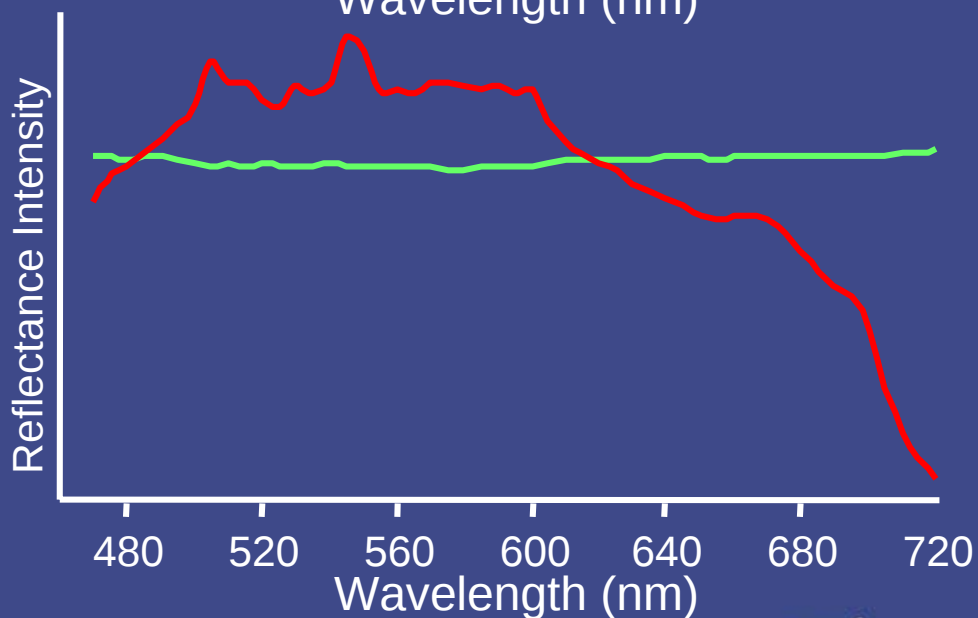
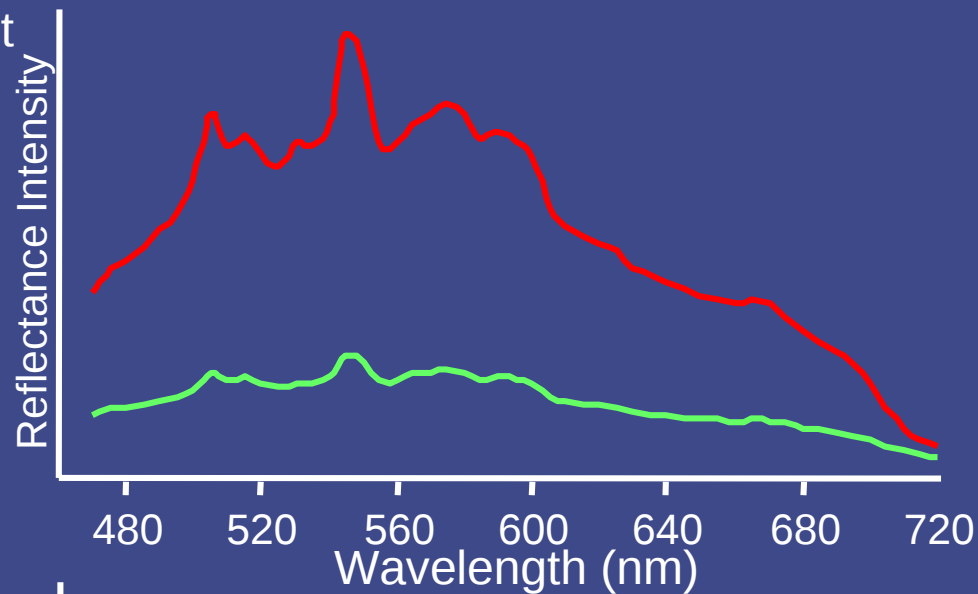


8 weeks



4 week old, Cyanoacrylate Fumed Fingerprint on Metal

Pre-processed, 675nm extract



4 week old, Cyanoacrylate Fumed Fingerprint on Metal

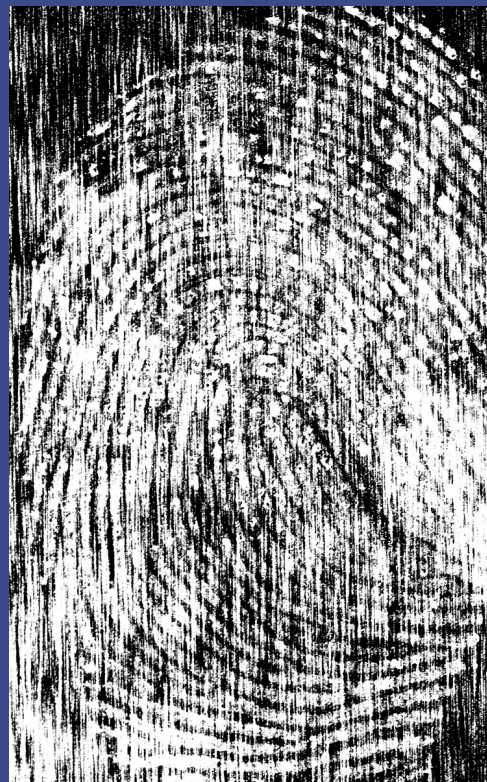
CI PRINT-Chemical Imaging Method



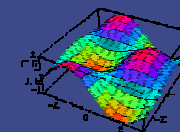
ChemImage Xpert Enhanced

PC1 Extract

Traditional Method

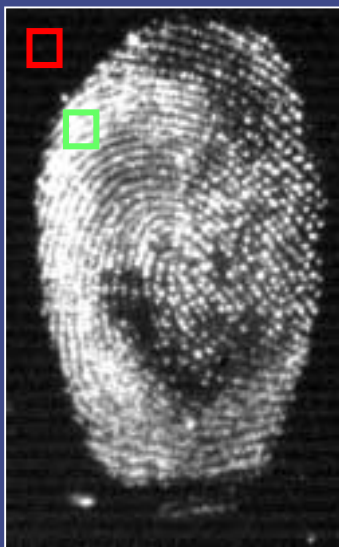
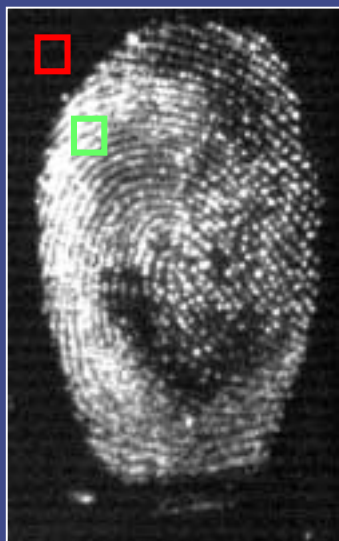


Adobe Photoshop Enhanced

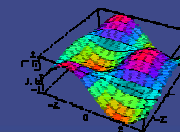
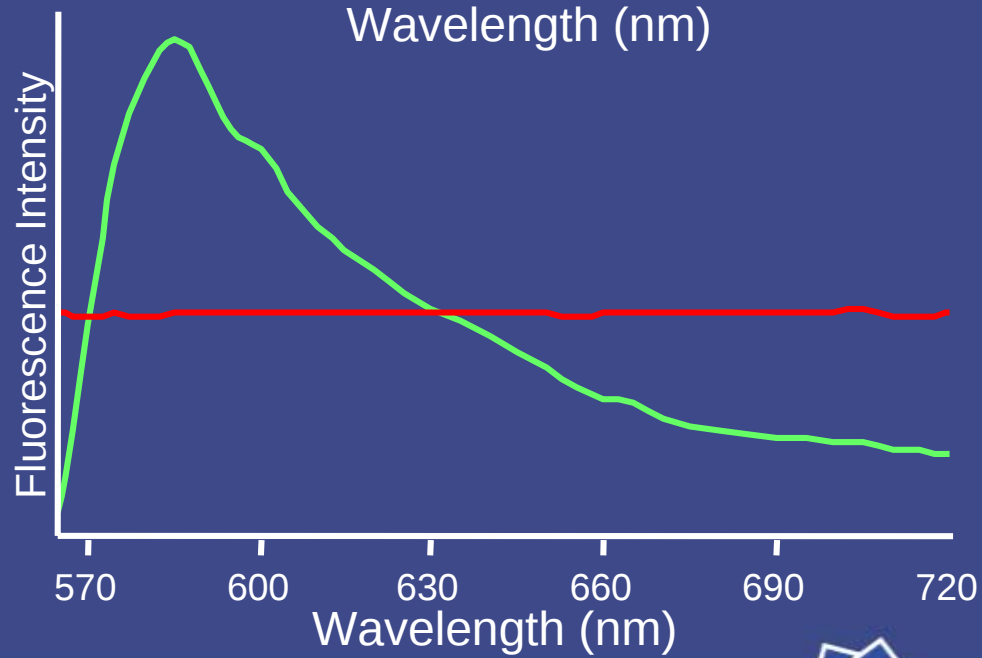
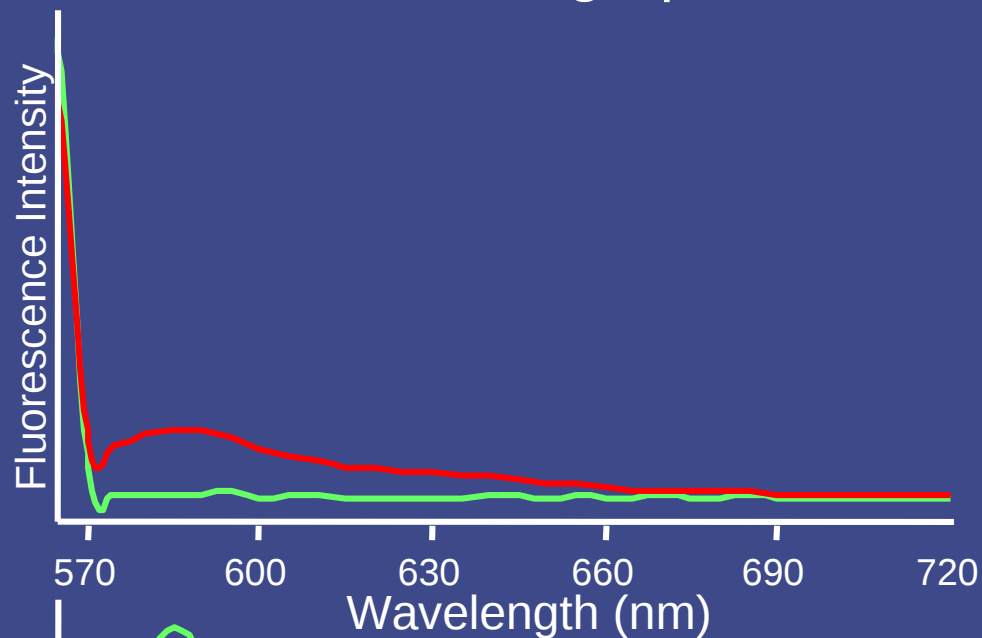


4 week old, DFO Treated Fingerprint

Pre-processed, 580nm extract



PC1 extract



1 week old, Untreated Fingerprint on Plastic

CI PRINT-Chemical Imaging Method



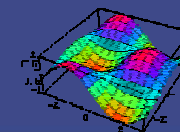
ChemImage Xpert Enhanced

545 Extract

Traditional Method



Adobe Photoshop Enhanced



Four Week-old Cyanoacrylate+Rhodamine6G Dye on Metal

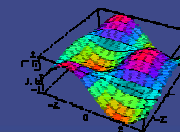
Traditional Method



CI Print



CONDOR



Two Week-old No Treatment on Glass

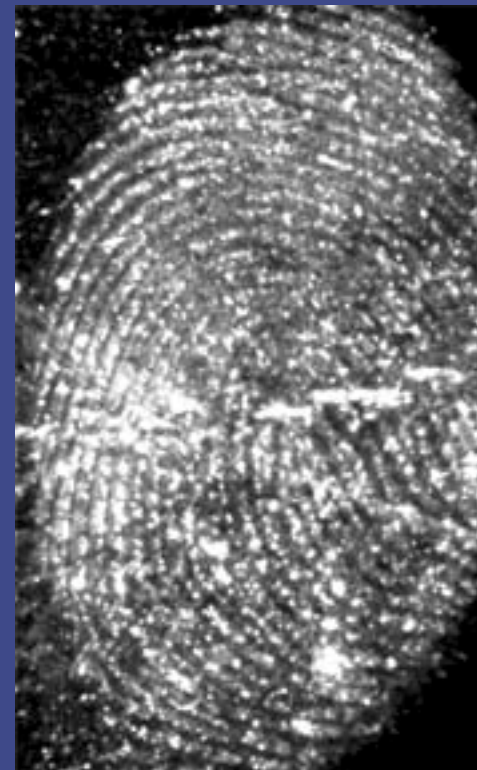
Traditional Method



CI Print



CONDOR



Conclusions

- ✓ ChemImage's CI PRINT Instrument provides comparable images to the CONDOR Macroscopic Chemical Imaging System
- ✓ The CI Print produced higher contrast fingerprint images than conventional methods, especially on samples with uneven backgrounds (metal substrate).
- ✓ Chemical Imaging processing methods often created higher contrast images than the raw images collected using the CI Print Instrument.
- ✓ Chemical Imaging processing methods did not add artifacts to the fingerprint image, nor deleted recognizable minutia present in the inked fingerprints.
- ✓ The CI Print is a viable tool for crime labs to evaluate routine fingerprint samples, but adds the benefit of spectral processing to enhance fingerprint contrast on difficult fingerprint samples through the use of Chemical Imaging Technology.