

On-site Detection and Identification of Chemical Warfare Agents with portable LIBS system

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ON-SITE DETECTION AND IDENTIFICATION OF CHEMICAL WARFARE AGENTS WITH PORTABLE LIBS SYSTEM.



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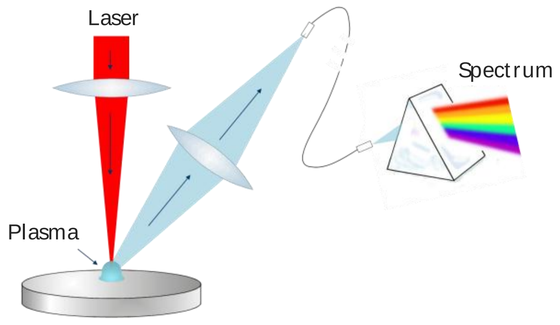
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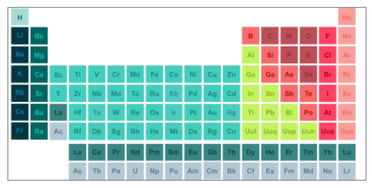
THE COMPACT LIBS TECHNOLOGY IS PORTABLE AND CAN QUICKLY IDENTIFY A SURFACIQUE CONTAMINATION OF CHEMICAL WARFARE AGENT (CWA) ON ALL KIND OF MATERIALS BY LASER INTERROGATION

LIBS* principal

*Laser Induced Breakdown Spectroscopy

The LIBS* technology is able to detect contamination by the spectroscopic analysis of the plasma emission produced by a laser focused on the surface to be inspected.





- All chemical element can be detected
- Real time detection, without sample preparation, possibility of stand-off analysis

EASYLIBS™

The specific data processing methodology for CBRN issues has been developed by CEA and integrated into the commercial EASYLIBS™ system marked by the IVEA company. The NRBC EASYLIBS™ version is able to detect and identify chemical warfare agent. It enables rapid deployment and field analysis without sample preparation.



	EASLYLIBS™ characteristics
Overall dimensions (cm³)	30x20x10 (probe), 40x30x30 (bag)
Weigth	1 kg (probe), 15 kg (total)
Autonomy	3-5h

Performances measurement on CWA

Quick identification of atomic markers in a complex substrate

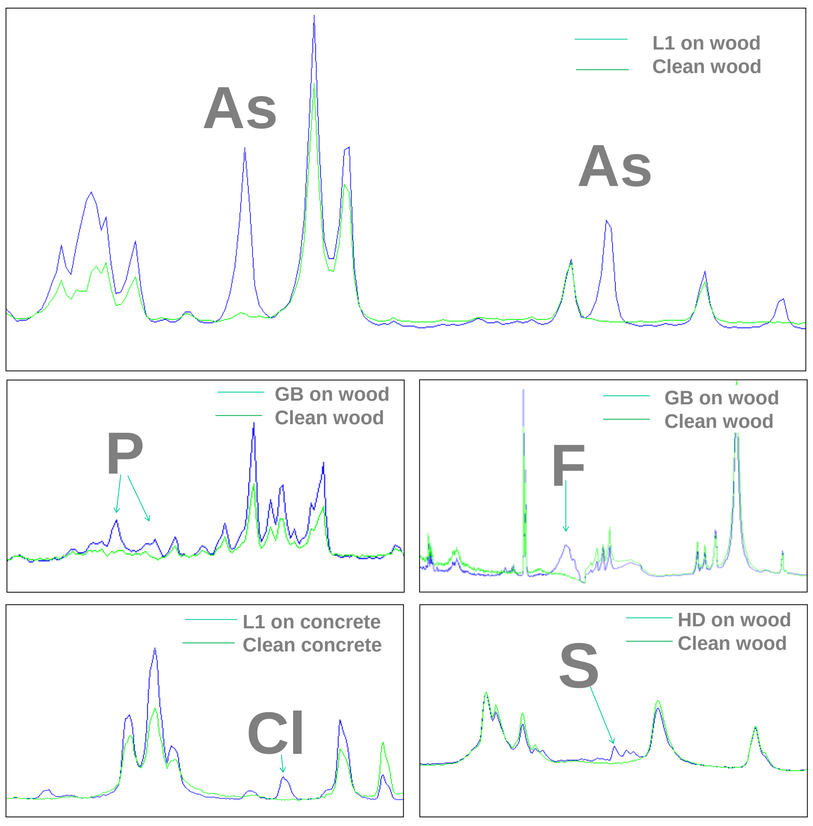
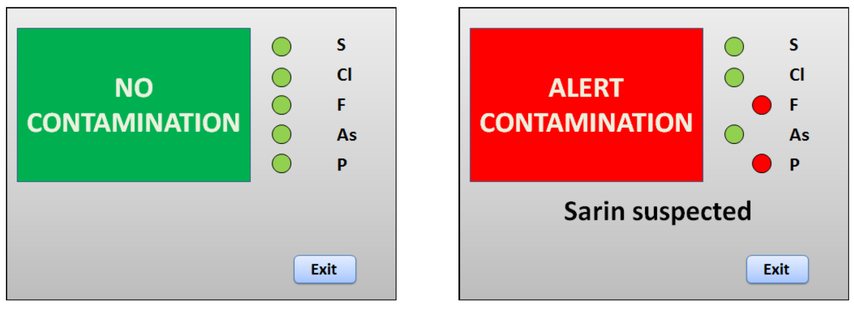




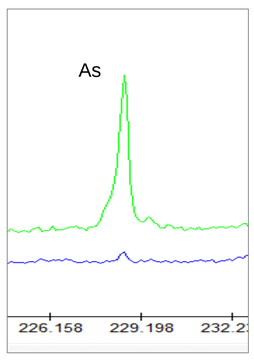
Photo credits CEA 2013,2014



Compound	Substrates: Aluminum, Wood, Concrete, Gloves, CARC, Ceramic
DMMP	P
GB	P, F
VX	P, S
L1	As, Cl
HD	Cl, S
GD	P, F
Blank	

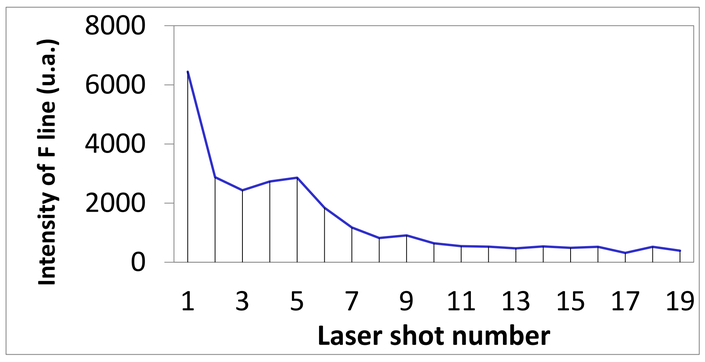
Results

Sensitivity : 10µg/cm² (obtained with sarin (GB) on concrete)



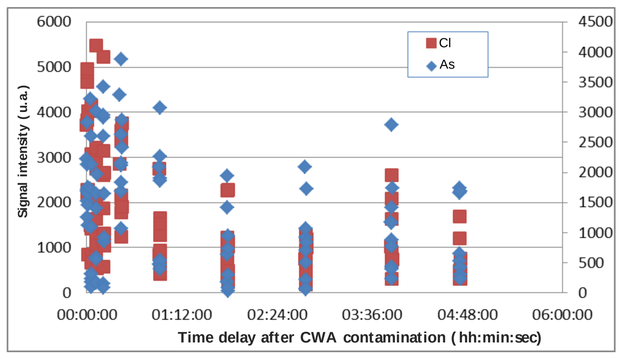
As signal before (green) and after decontamination (blue)

CONTROL OF DECONTAMINATION



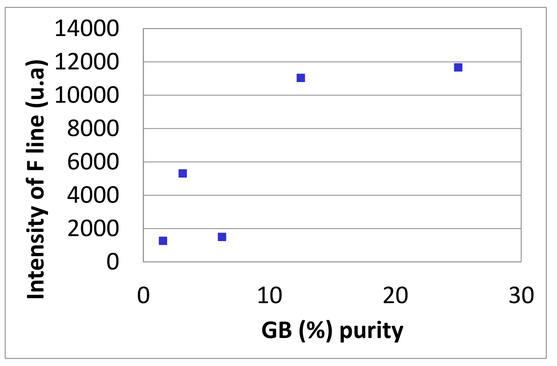
Cl signal vs. number of laser shot (with Lewisite (L1) on wood)

DEPTH PROFILING



Cl and As signal vs. time (with Lewisite on concrete). Decreasing of signal corresponds to evaporation of L1 with time in the fume hood.

CONTAMINATION'S MONITORING



F signal vs. sarin (GB) purity (diluted in hexane). (100% correspond to pure toxic)

SENSITIVITY

Conclusion

- Capability of detection and identification of CWAs instantaneously (one laser shot).
- Complementarity between AP4C equipped with S4PE and Easylibs (best sensitivity for As, F et Cl with LIBS)
- Sensitivity of 10µg/cm²
- Sub-surface analysis (for old contamination for example)
- No memory effect

Perspectives

Futures evolution of EASYLIBS™ :

- Disposable tips
- Volume and weight decrease

Concepts of uses :

- Quick diagnostic of contamination for sorting (no memory effect)
- Control of decontamination
- Zoning of dangerous perimeters
- Identification of CWAs