

LIBS probe for in-situ material characterization

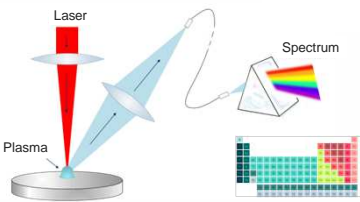
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Introduction:

LIBS technique is well adapted for in-situ analysis. We have developed a specific probe dedicated to remote characterization for preparation of decommissioning

LIBS* principle

*Laser Induced Breakdown Spectroscopy



The LIBS* technology consists in the spectroscopic analysis of the plasma emission produced by a laser focused on the surface to be characterized.

Material characterization:

- Chemical element detection
- Concentration measurement
- Materials identification

LIBS advantages

- All chemical elements can be detected
- Can be applied to solid, liquid or gas
- No sample preparation
- Real time measurement
- Remote or stand-off

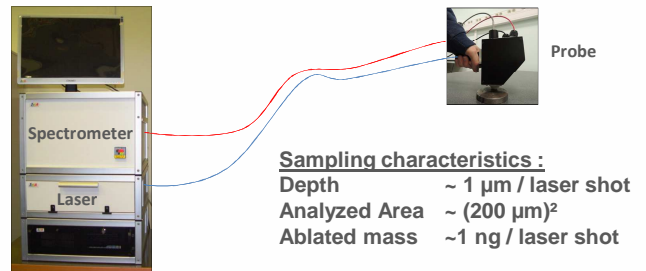
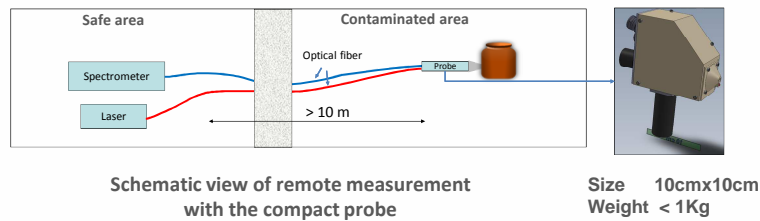
Needs for decommissioning

- Inventory
- Control of contamination
- In-situ waste identification for sorting

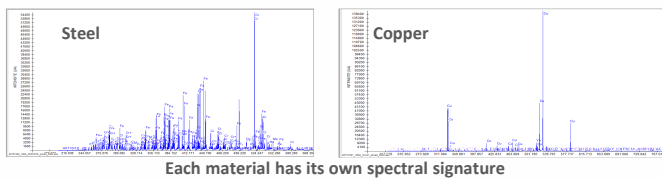
with the constraints:

- Irradiation or contamination
- Many measurements to do
- Difficulties to take out the samples

LIBS probe characteristics

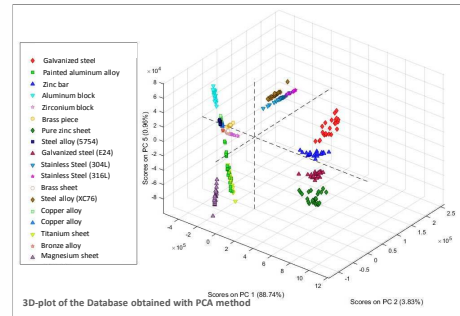


Discrimination of materials



Building of a database using mathematical method

Discrimination of different metals with chemometrics method



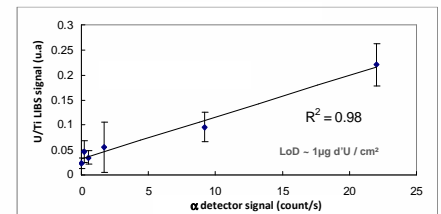
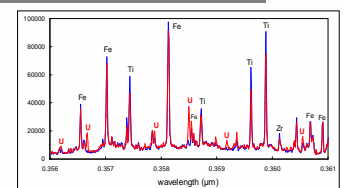
Grouping of points according to the material

This probe is able to automatically identify a material (if it is known in the database)

Results for different applications

Control of contamination / Inventory

Surface analysis of contaminated walls (at CEA Cadarache) :



- This probe is able to detect surface contamination
- Furthermore, the chemical composition, can be obtained in order to prepare decommissioning (inventory)

Conclusion

- We have developed a LIBS system with the capability to perform remote characterization of materials into nuclear facilities.
- This system can be used for waste sorting, inventory or control of contamination

Perspective

Our demonstrator is ready to be tested in other in-situ conditions in nuclear facilities