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Shielded Electron Microprobe and some of its main applications in Hotlabs

Mona P. Moret[1,*], Claire Le Gall[2], Karine Hanifi[2], Isabelle Felines [2], Thierry Blay[2], Anne-Sophie Robbes[1], Carl Henderson[1], Fabienne Audubert[2], Yves Pontillon[2], Jerôme Lamontagne[2]

[1] CAMECA, 29 quai des Grésillons 92622 Gennevilliers Cedex, France

2 CEA Cadarache, DEN/DEC, 13108 SAINT-PAUL-LEZ-DURANCE, France

[*]mona.moret@ametek.com

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Abstract: Thanks to its precision, its reproducibility and its stability, Electron Microprobe is a well suited technique for accurately analyzing nearly all chemical elements at concentration levels down to few 10's ppm with a spatial resolution of about 1 µm, which is relevant to microstructures in a wide variety of materials and mineral specimens. For irradiated samples, EPMA is also one of the technique of choices and can support nuclear fuel development, control, metallurgical or glass analysis. It reveals fine compositional details and the distribution of main and trace elements across the surface of the sample.

CAMECA leader in scientific instruments has been manufacturing Electron Microprobe (EPMA) since 1958 and will present its latest CAMECA shielded EPMA model, SKAPHIA released in 2016 for hotlab facilities. One example of the LECA/STAR shielded EPMA in hotlab handling nuclear fuel will be highlighted. In this example, the microstructure and chemical evolution of fuel pellets submitted to two different nuclear severe accident scenarii are shown. EPMA helped to highlight the impact of the atmosphere (i.e the oxygen potential) on the behavior of the fuel and fission products during these tests. These studies are of particular importance to evaluate and better predict the consequences of such an accident in term of contamination.