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Elemental Analysis of Construction Materials Using Compact Neutron Systems –Recent Results within the IKUR-RIKEN Collaboration

Thursday, 27 February 2025 14:00 (20 minutes)

Within the remit of the IKUR strategy in the Basque Country [1], we have recently embarked on a critical assessment of available technologies for the provision of neutrons across low-flux compact space. One important aspect of these activities relates to the implementation of scientific and technological demonstrators, with an initial focus on construction materials of direct relevance to the industrial sector in the Basque Country [2]. Following initial efforts using neutron-activation analysis with last-generation DT sources [3], this contribution extends these first results to the implementation of in-situ prompt-gamma activation analysis, as part of an ongoing collaboration across IKUR and RIKEN-RANS. In particular, we have studied in detail the limits of detection and quantitation of exogenous chemical species, present as a result of exposure to harmful environmental conditions. Building upon previous works at RIKEN-RANS [4,5], special attention has been placed on an assessment of the challenges associated with the quantitative analysis of these complex, multi-component media using neutron-activation techniques. In addition to the above, we have also capitalised from the unique pulsed nature of both RIKEN-RANS I and II to explore current and emerging capabilities across the broad neutron-wavelength range available at these state-of-the-art accelerator-driven compact neutron systems.

[1] The IKUR strategy: www.science.eus/en/ikur
[2] Green Concrete Lab: greenconcretelab.com
[3] C. Macia-Castello et al., EPJ Web of Conferences 298 05002 (2024).
[4] Y. Otake, J. Neutron Res. 23 119 (2021).
[5] Y. Wakabayashi et al., J. Adv. Concr. Technol. 17 571 (2019).

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