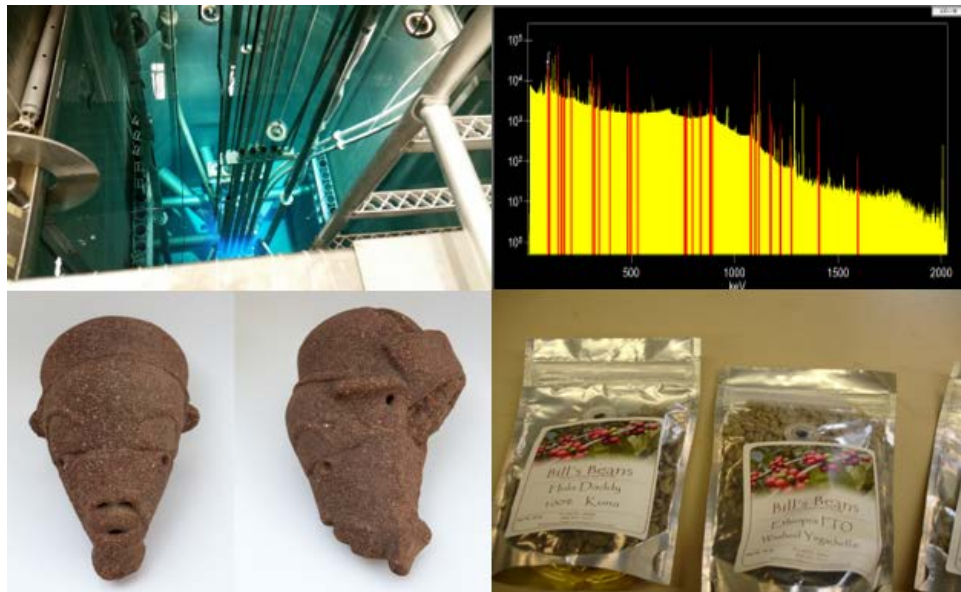


# Nuclear Activation Analysis and Its Applications

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Nuclear Activation Analysis is a multi-elemental nuclear assay that has high accuracy, extreme sensitivity, and superiority in non-destructiveness. It generally includes photon activation analysis (PAA) and neutron activation analysis (NAA) according to the irradiation sources. To make this radioanalytical technique more attractive and competitive, we scrutinized the underlying nuclear physics, simulated the activation beam with Monto Carlo codes, estimated the radioactivity of the sample before the irradiation starts, discussed the feasibility of the quasi-absolute method, and implemented an online computer program to facilitate the calculations. To describe its applications in provenance studies, we discussed two cases: one is photon activation of coffee samples from several locations around the world as the initial step in assessing the relationship between trace elements in illicit drugs and the soils in which they were grown, the other is neutron activation of archaeological samples to obtain provenance information of the Nok sculptures collected by the I.P. Stanback Museum at the South Carolina State University. Both studies have led to some interesting results and demonstrated the promising future of nuclear activation analysis.



Dr. Zaijing Sun is an assistant professor at the Applied Radiation Sciences Laboratory (ARSL) at the South Carolina State University (SCSU). Before joining SCSU, he was a postdoc in the Nuclear Engineering division at the Argonne National laboratory. His research focuses on applying nuclear analytical techniques to environmental, biological and agricultural samples. Other research interests include temporal data mining (TDM) in nuclear decommissioning, transportation of nuclear materials, Monte Carlo simulations of nuclear processes, health physics, and medical isotope production.