TEL AVIV UNIVERSITY אוניברסיטת תל-אביב

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RESEARCH FELLOWSHIP IN SCIENTIFIC DATING

Tel Aviv University's School of Physics and the Department of Archaeology collaborate on a number of interdisciplinary archaeometry research projects. Archaeometry involves the application of scientific techniques to the analysis of archaeological materials. Our group includes Israel Finkelstein & Alex Fantalkin (archaeology) and Eli Piasetzky & Murray Moinester (Physics) at Tel Aviv U.; as well as Eli Barkai (Bar Ilan U.), Moira Wilson (Manchester), Chris Hall (Edinburgh), and David Bish (Indiana).

We seek an excellent young scientist at the postdoc level who completed his/her Ph.D. after Oct. 2005. Students who submit thesis before Oct. 2010 are also eligible. The fellow would join our project involving a radically new technique for precisely dating fired ceramics; based on rehydroxylation (RHX), a moisture induced chemical reaction. For this project, we will work in a TAU laboratory now under construction; and also at the Manchester & Indiana laboratories.

RHX dating relies on the fact that molecules in clay ceramics start reacting and taking OH hydroxyl radicals from environmental moisture as soon as they are removed from the kiln following firing. The RHX reaction kinetics are proportional to (time)1/4, the quartic root of the elapsed time. The amount of hydroxyl that is chemically combined with the ceramic material provides an 'internal clock' that can be read to determine its age – the elapsed time since it was fired.

Further information is available via the presentations at **http://www-nuclear.tau.ac.il/megiddo-2010** of a recent workshop on archaeological dating.

Experimental work will include collection of pottery samples from the Megiddo Expedition, chemical treatment of the pottery, precision mass and kinetics measurements, simulations and data analysis. We will carry out extensive work on all aspects of the RHX measurement protocol in order to define an optimal experimental protocol. We will apply the RHX method to already-characterized artifacts to evaluate the accuracy and precision of the method. We will explicitly test the temperature and humidity dependence of the quartic root kinetics, and help determine the appropriate mean lifetime temperature independently of meteorological records. We will study under what circumstances the quartic root kinetics holds via kinetic studies on dehydroxylation and rehydroxylation under controlled-environment conditions. We will use X-ray powder diffraction (XRD) to determine the onset and kinetics of structural breakdown; thermogravimetric analysis (TGA) to monitor the evolution of volatiles (primarily H2O); and infrared spectroscopy to study RHX by measuring the concentration of "new" OH groups.

Applicants should submit to "Eli Piasetzky" <**eip@tauphy.tau.ac.il**> before 22 July 2010 via email a letter describing interest and qualifications for this position; including email attachments with the following documents as word or pdf files: a CV, a publication list. Following an interview, candidates will then be asked to supply before 2 Aug. 2010 a document showing Ph.D. eligibility and three letters of recommendation.

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