Postdoctoral Fellowship on *In Situ* Electron Microscopy and Image Processing

A postdoctoral position is available at Arizona State University in the general area of exploring atomic level dynamics in catalytic nanoparticles with *in situ* and *operando* transmission electron microscopy coupled with data science techniques. Developing a fundamental understanding of catalytic systems will have a potentially large impact on areas such as energy, healthcare, materials, medicine, transport, and the environment. The chemical transformation processes taking place on a catalyst are associated with dynamic structural re-arrangements and conformational changes. These structural evolutions are mostly unexplored due to the lack of experimental data with sufficiently high spatial and temporal resolutions. Recently, such data has become available due to developments in experimental techniques including electron microscopy which make it possible to measure a large number of system configurations in catalysts under reaction conditions at high spatiotemporal resolutions. The aim of this research is to harness recent advances in data science coupled with atomic-level physical modeling to extract descriptors of dynamic behavior from these newly available datasets.

The successful applicant will become part of a large inter-university team to investigate and characterize dynamic processes in active nanoparticle catalysts. The applicant must possess outstanding communication skills and be able to clearly communicate the scientific significance of *in situ* electron microscopy datasets to colleagues with backgrounds in mathematics, statistics and data science. The applicant will be responsible for acquiring large *in situ* TEM datasets of catalytic nanoparticles with direct electron detectors. Suitable subsets of the data will be selected and provided to data scientist collaborators, who will develop and apply advanced methodology in unsupervised processing of noisy, high-dimensional data, based on machine learning techniques such as neural networks to extract the structural evolutions from the datasets. Extensive image simulation with dynamic models provided by computational materials scientist will also be folded into the data analysis and interpretation.

Basic Qualifications:

- A Ph.D. in physics, materials science or related disciplines is required.
- Experience in aberration corrected high resolution TEM imaging of nanoparticles.
- Experience image processing and image techniques.
- Experience in scripting/programming (Python, Matlab, C++) for image processing.

Experience in scripting/programming (Python, Matlab, C++) for processing of EELS and S/TEM data.

Preferred Qualifications:

- A knowledge of catalyst, catalytic testing, together with some knowledge of machine learning techniques is also desired but not essential.

To apply, please send your cover letter (specifying *in situ* and image processing position), CV and names with contact information of three references to:

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