

Deciphering Nanoscale Interactions: Artificial Neural Networks and Scanning Probe Microscopy

Sergei V. Kalinin

Oak Ridge National Laboratory, Oak Ridge, TN

Scanning Probe Microscopy techniques provide a wealth of information on the nanoscale interactions. The rapid emergence of spectroscopic imaging techniques in which response to local force, bias, or temperature is measured at each spatial location necessitates the development of data interpretation and visualization techniques for 3- or higher dimensional data sets. In this talk, I will briefly summarize recent advances in applications of neural network based artificial intelligence methods in scanning probe microscopy. The examples will include biological identification based on dynamics electromechanical response, direct mapping of dynamic disorder in ferroelectric relaxors, and reconstruction of random bond-random field Ising model parameters in ferroelectric capacitors. The future prospects for smart SPMs are discussed.

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