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Coherent Evanescent Wave Imaging System

Nanotechnology is the study of the control of matter at the atomic and molecular level, and is focused mainly on the creation of materials and equipment to work within that scale. One thing holding back the advancement of this technology is the lack of experimental tools capable of visualizing nanoprocesses in real time across their full range of operation. Near-field detection systems, primarily consisting of different Scanning Probe Microscopes, provide the best current option for this type of activity. They have a detection tip that is sensitive to nanoscale changes in its vicinity traverse over a surface to create a topographical map of its properties. However, despite excellent detection rates and resolution, the premise of the method limits its ability to monitor nanoprocesses over a long period of time or large space, especially apparent in the domain of radiofrequency.

Researchers at Arizona State University have developed a new imaging technology different from all currently in existence. Through the use of coherent wavefronts and holographic techniques, all common wave imaging methods are viable for nanostructure detection. The subsequent fusion of these images gathered from different sources and wavelengths can produce vivid multi-spectral characterizations and ultimately real time nanoprocess visualization.

Potential Applications

- Nanotechnology Research (nanostructure and process visualization)
  - Medicine
  - Electronics
  - Energy Production

Benefits and Advantages

- More efficient multi-spectral characterizations of nanostructures in real time
- Fusion of multiple images creates the visualization of a nanoprocess over its complete range of operation
- Readily available optical frequency sources and techniques for wave imaging can be employed