A Digital Micrograph Script for Detection of Astigmatism in Transmission Electron Microscopy (TEM) Images

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Technology description

Background

Transmission Electron Microscopy (TEM) is a technique used for capturing high resolution images of a wide range of materials including macromolecular complexes at near-atomic resolutions. Minimization of astigmatism of the objective lens is a critical task essential for high resolution TEM imaging. However, the most widely used method currently involves visually examining the roundness of a diffractogram (Thon rings) and simultaneously adjusting objective lens stigmators to make the Thon rings as circular as possible. The drawbacks to this method include limited sensitivity for small astigmatism and potential bias caused by the astigmatism of human eyes. Users can spend upwards to 30 minutes making adjustments.

Technology Summary

Researchers at Purdue University have developed a system and method that allows for fast and sensitive detection of astigmatism in TEM images. A digital micrograph script allows for such improvements in the readings of astigmatism and allows for real-time feedback to help guide the adjustment of objective lens stigmators and correct the astigmatism of the objective lens. In addition, the script automatically reports the critical imaging parameters by analyzing the Thon Rings. All of this can help improve the accuracy and resolution of TEM imaging.

Application area

Analysis method in physical, chemical, and biological sciences
Cancer research
Virology
Materials science

Advantages

Fast, sensitive detection of astigmatism in TEM images
Real-time feedback adjustment of objective lens
Users rely on script versus visual examination
Less bias than visual examination
Works with existing systems
Automatic report of the critical imaging parameters

Institution

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