

## Summit to: Methods and Physical Modeling in Nanomaterial Characterization

### Monte Carlo-dynamical method to the investigation of electron diffraction in cylindrically symmetric rotating crystals

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**EXTENDED ABSTRACT:** Electron diffraction is an important way for electrons to interact with crystals. The physical theory and experimental techniques on electron diffraction are well established. We report a crystal film with a special structure that allows simultaneous observation of sample morphology and Kikuchi patterns in raster scan mode in SEM. This new experimental observation suggests potential mechanism beyond existing diffraction theories. We developed a Monte Carlo-dynamical combined approach to simulate the mechanism of electron interaction with this crystal. The simulation results show that this material has a novel cylindrical symmetric rotational crystal (CSRC) structure that can control the diffraction direction of electrons by a specific rotation distribution of crystal planes, while being independent of the angle and energy of the incident electrons within a certain range. In other words, CSRC can regulate the emission direction of electrons only by the rotation distribution of the crystal plane regardless of the electron energy, which gives a new idea of electron manipulation. As an example, we simulated a CSRC with a specific crystal plane arrangement, which enables the focusing of the electron beam at the micron scale.

**Keywords:** cylindrical symmetric rotational crystal; Kikuchi pattern; electron diffraction; SEM



#### BIOGRAPHY

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