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Femtosecond mega-electron-volt electron microdiffraction

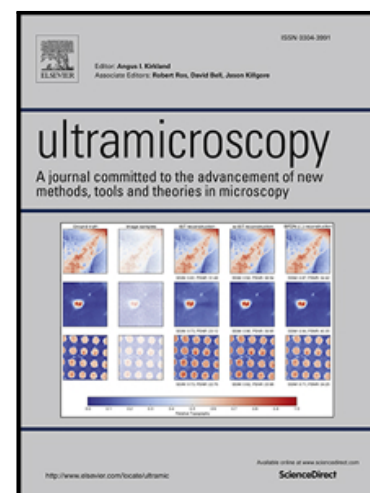
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Highlights:

- We experimentally demonstrated a time-resolved electron microdiffraction technique using mega-electron-volt electrons for studies of ultrafast structural dynamics over localized crystalline domains
- The high resolving power of this technique with 5 μm (root mean square) electron probe size was demonstrated by high SNR diffraction pattern from a 10 μm paraffin crystal.
- The high temporal resolution of this technique was estimated to be 100 fs (root mean square) from the time-resolved phonon softening mode in optical-pumped polycrystalline Bi.
- This technique delivers pulses of 10k electrons at 4.2 MeV energy with a normalized emittance of 3 nm-rad at 180 Hz repetition rate.
- This new characterization capability will open many research opportunities in material and biological sciences.

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