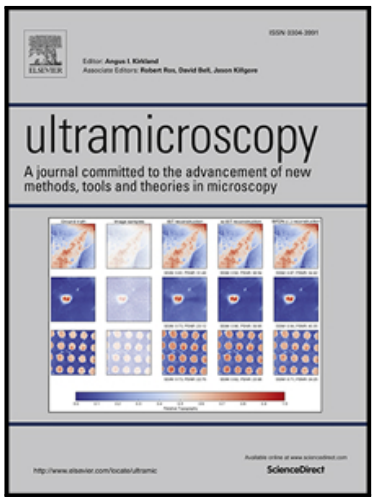


# Femtosecond mega-electron-volt electron microdiffraction

X. Shen , R.K. Li , U. Lundström , T.J. Lane , A.H. Reid , S.P. Weathersby , X.J. Wang

PII: S0304-3991(17)30195-X
DOI: 10.1016/j.ultramic.2017.08.019
Reference: ULTRAM 12450

To appear in: *Ultramicroscopy*

Received date: 21 April 2017
Revised date: 27 July 2017
Accepted date: 29 August 2017

Please cite this article as: X. Shen , R.K. Li , U. Lundström , T.J. Lane , A.H. Reid , S.P. Weathersby , X.J. Wang , Femtosecond mega-electron-volt electron microdiffraction, *Ultramicroscopy* (2017), doi: 10.1016/j.ultramic.2017.08.019

**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 5um (root mean square) electron probe size was demonstrated by high SNR diffraction pattern from a 10 um 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.