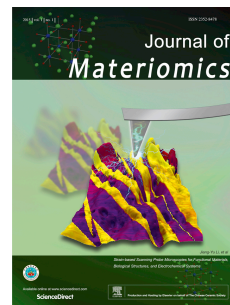


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Imaging ferroelectric domains via charge gradient microscopy enhanced by principal component analysis

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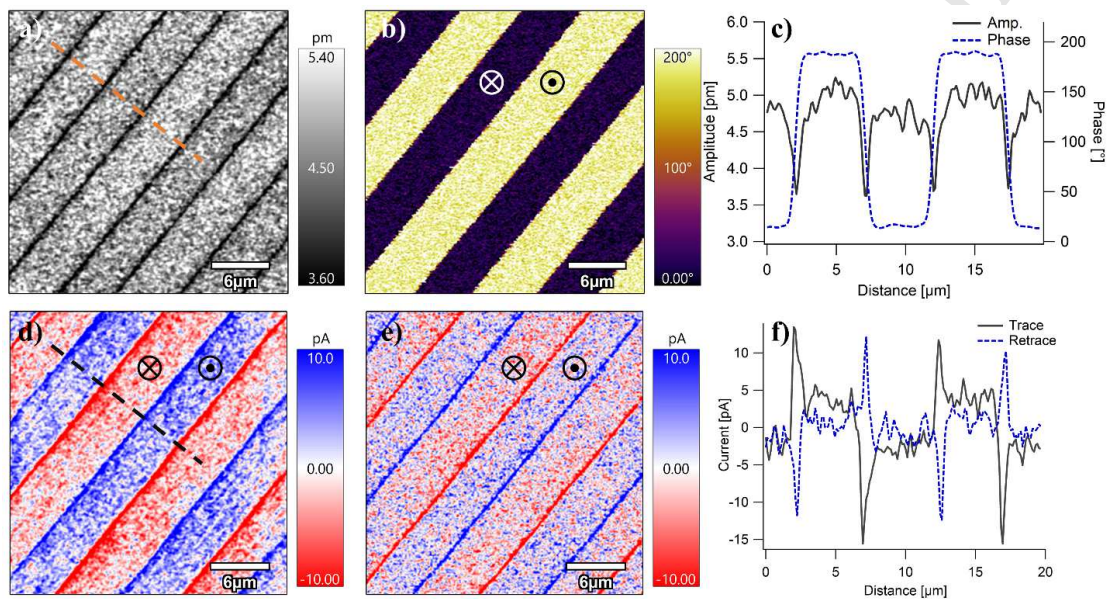
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## Graphical Abstract

## Imaging Ferroelectric Domains via Charge Gradient Microscopy Enhanced by Principal Component Analysis

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- We used charge gradient microscopy (CGM) to image ferroelectric domains of lithium niobate.
- We applied principal component analysis (PCA) to enhance the signal-to-noise ratio.
- We found CGM signal increases linearly with the scan speed while decreases with the temperature under power-law.
- The data suggests as imaging mechanism scraping and refilling of surface charges within domains, and polarization change across domain wall.
- We estimated the spontaneous polarization and the density of surface charges in agreement with literature data.

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