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Image contrast dependence on the field emitter in near field emission scanning electron microscopy OLIVIER SCHOLDER, TARYL KIRK, LORENZO DE PIETRO, THOMAS BAEHLER, URS RAMSPERGER, DANILO PESCIA, Swiss Federal Institute of Technology Zurich (ETHZ) — In conventional scanning electron microscopy (SEM) the lateral resolution is limited by the electron beam diameter impinging on the specimen surface. Near field emission scanning electron microscopy (NFESEM) provides a simple means of overcoming this limit; however the most suitable field emitter remains to be determined. NFESEM has been used in this work to investigate the W (110) surface with single crystal Tungsten tips of (310), (111), and (100)-orientations. The topographic images generated from both the electron intensity variations and the field emission current indicate higher resolution capabilities with decreasing tip work function than with polycrystalline Tungsten tips. The confinement of the electron beam transcends the resolution limitations of the geometrical models, which are determined by the minimum beam width. Moreover the electron intensity images show more detail with higher resolution than field emission current imaging. This implies that the electron yield is more sensitive to additional parameters, which may be the local work function, specimen curvature, primary beam energy, and detector sensitivity.

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