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ISONOMAL FIELD-DESORPTION IMAGING OF PROTEIN MACROMOLECULES

J. A. Panitz
Sandia Laboratories, † Albuquerque, NM 87185

and

Ivar Giaever
General Electric Research and Development Center
Schenectady, NY

ABSTRACT

Benzene, field desorbed at 30K from thermally annealed tungsten field emitters in electric fields approaching 0.3 V/Å, is being used to image the morphological contour of protein molecules1 with a resolution of better than 30 Å at magnifications greater than 105. Image contrast relies upon a distinct and measurable difference in the desorption field of benzene adsorbed at low temperature (in the absence of a field) on the molecule, and on the adjacent tip surface. Images obtained after dosing from aqueous solutions of Ferritin, Collagen, BSA and IgG have demonstrated the feasibility of the technique, but have also accentuated the difficulty of reproducibly depositing individual molecules on substrates having small radii of curvature. Large radii tips (> 2500 Å) can be more readily dosed with individual molecules, as confirmed by Transmission Electron Microscope images showing isolated Ferritin molecules on tungsten emitters. An extension of the imaging technique to smaller organic molecules seems possible if dosing conditions and image resolution can be improved.

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