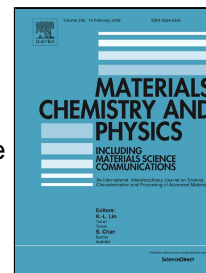


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Field emission characteristics of basal plane and cross-sectional edges of graphite made from graphite oxide

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Abstract

Graphite made from graphite oxide with well-defined basal plane (perpendicular to the c-axis or stacking orientation) and cross-sectional edges (along to the stacking orientation) are utilized to investigate the field emission characteristics. The significant differences of basal plane and edges from the same graphite sample are characterized. It is found that the basal plane with wrinkles has lower turn-on field (5.01 V/ μm , corresponding to a current of 10 $\mu\text{A}/\text{cm}^2$) and threshold field (7.38 V/ μm , corresponding to current of 1 mA/ cm^2), compared to the edges. Fowler-Nordheim (FN) analysis indicates that the basal plane has larger field enhanced factor (1374, while 453 for edges), but smaller emission area efficiency (1.24×10^{-3}) than the edges (0.526). Characterizations show that the sparse wrinkles on the basal plane play important roles as emission sites; the oxygen-containing groups which tend to form on the edges lead to an increase in work function and the deterioration in field emission performance.

Keywords: Field emission, Basal plane, Edge, Graphite

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