



## **Plasma Treated Vertically Aligned Tellurium Nanorods Enhances Field Emission and Photoluminescent**

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Plasma-treated high-density vertically aligned tellurium nanorods (TNRs) arrays have observed significant improvement in electron field emission (FE) properties. The TNRs are grown by the catalyst-free chemical vapor deposition (CVD) method and are systematically characterized by FESEM, EDS, TEM, HRTEM, XRD, and XPS. Then

TNRs were treated with Argon (A) and Nitrogen (N) plasma, and it was observed that the field emission of TNRs

containing 40–50 nm size has been enhanced from 6.22  $V\mu\text{m}^{-1}$  to 3.25  $V\mu\text{m}^{-1}$  which is more than 52%. This research reveals that plasma treatment has effectively modified the surface morphology (confirmed by TEM)

and created sharp tips on TNRs which act as an extra source of field emitters believed to contribute to the enhancement of field emission. Plasma-treated TNRs not only exhibited excellent FE properties (3.25  $V\mu\text{m}^{-1}$ ), but these aligned TNRs also portrayed tremendous stability with insignificant FE current fluctuation (<4%) for 60

min. The finding of this research shows the improvement in the field emission which has potential applications in device fabrications.