

## Deposition of tungsten oxynitride nanowires through simple evaporation and subsequent annealing

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A high density of tungsten oxynitride nanowires was synthesized by ammonia annealing of  $WO_3$  nanowires, which were grown on a tungsten substrate by thermal evaporation of  $WO_3$  powder. The morphology of  $WO_3$  nanowires was not changed upon ammonia annealing at 650 °C although the color of the sample changed drastically. XRD and TEM analysis showed that the structure of the ammonia annealed nanowires matched well with cubic oxynitride with the structure of  $W_{0.62}(N_{0.62}O_{0.38})$ . The XPS and EDX also confirmed the formation of the tungsten oxynitride nanowires. Field emission measurements showed a low turn-on field of 4.45 V/ $\mu$ m for the  $WN_xO_y$  nanowires, indicating that they can be used as potential field emitters.