

# Optical Properties of Metal Oxide Nanostructures With Different Exposed Facets

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## Abstract

Controlling the morphology of crystals in order to control its functional properties is essential to fabricate high performance devices for a variety of uses. nanostructures have gained a great deal of attention lately due to their great potential in many applications benefiting from their reduced dimensionality and high surface to volume ratio.<sup>1-5</sup>

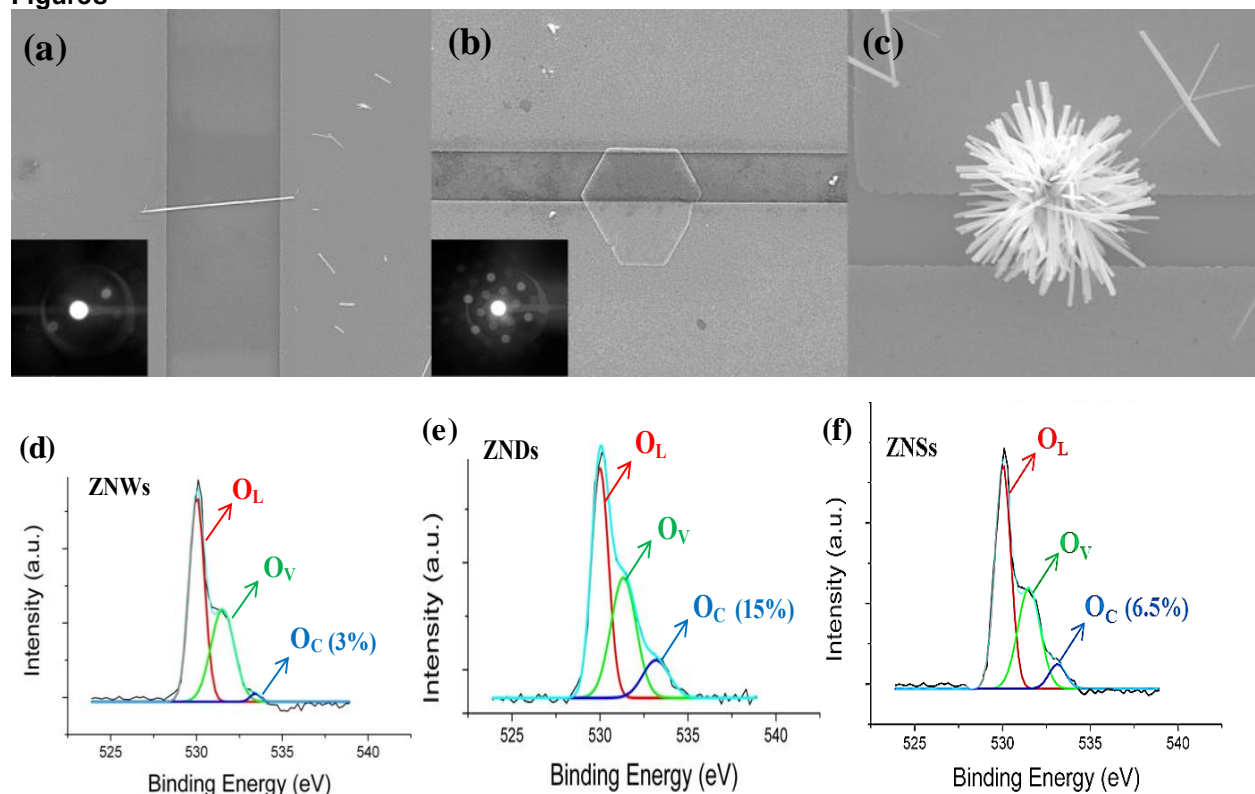
Nanostructures with different exposed facets are synthesized hydrothermally at low temperature (nanowires, nanodisks, and nanostars) as shown in figure 1(a)-(c), respectively. The morphology and structure of these nanostructures are characterized by means of SEM, STEM, XRD, and SAED. The optical properties of nanostructures showing different exposed facets are also characterized using XPS analysis.

Based on XPS data (figure 1(d)-(f)), SEM (figure 1(a)-(c)), and SEAD (inset of figure 1(a)-(b)) analysis, nanostructures with polar exposed facets (nanodisks) have the largest number of chemisorbed oxygen on its surface.

## References

- [1] Alenezi, M. R.; Henley, S. J.; Emerson, N. G.; Silva, S. R. P. *Nanoscale*, (6), 235–247, 2014.
- [2] Alenezi, M. R.; Alshammari, A. S.; Jayawardena, K. D. G. I.; Beliatas, M. J.; Henley, S. J.; Silva, S. R. P. *J. Phys. Chem. C* 2013, 117, 17850–17858.
- [3] Alenezi, M. R.; Abdullah S. Alshammari, Peter D. Jarowski, Talal H. Alzanki, Simon J. Henley, and S. R. P. Silva. *Langmuir*, 2014, 30, 3913–3921.
- [4] Beliatas, M. J.; K. K.; Gandhi, Lynn J. Rozanski, Rhys Rhodes, Liam McCafferty, Alenezi, M. R.; Alshammari, A. S.; Mills, C. A.; Jayawardena, K. D. G. I.; Henley, S. J.; Silva, S. R. P. *Adv. Mater.* 2014, 26, 2078–2083.
- [5] Alenezi, M. R.; Alzanki, T. H.; Almeshal, A. M.; *International Journal of Science and Research*. 2014, 3, 588–591.

## Figures



**Figure 1.** SEM images of ZnO (a) nanowire (inset: SAED pattern), (b) nanodisk (inset: SAED pattern), and (c) nanostar; XPS spectra of ZnO (e) nanowires, (f) nanodisks, and (g) nanostars.