Shape engineering driven by selective growth of SnO_2 on doped Ga_2O_3 nanowires

Manuel Alonso-Orts[†], *Ana M. Sánchez** [‡], *Steven A. Hindmarsh* [‡], *Iñaki López*[†], *Emilio Nogales*[†], *Javier Piqueras*[†], *Bianchi Méndez** [†, ‡]

[†]Departamento de Física de Materiales, Facultad de Ciencias Físicas, Universidad Complutense de Madrid, 28040-Madrid, Spain

[‡]Department of Physics, University of Warwick, Coventry, CV4 7AL, United Kingdom

KEYWORDS. Complex oxide nanowires, selective growth, crossed nanowires, transmission electron microsopy, Cathodoluminescence

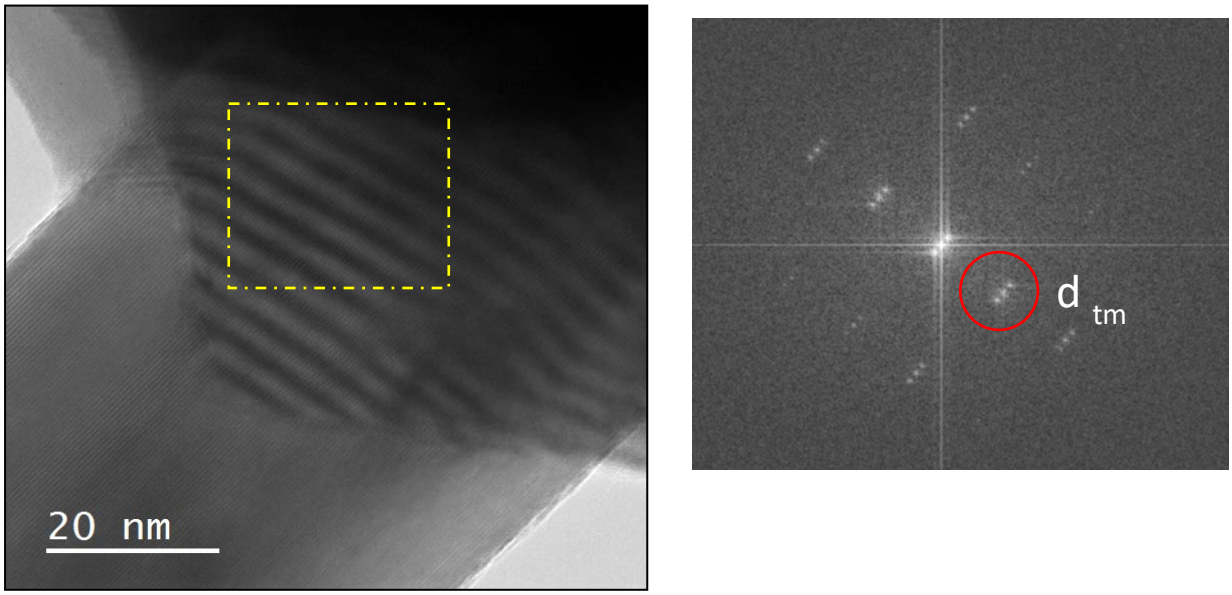
* E-mail: a.m.sanchez@warwcik.ac.uk

* E-mail: bianchi@ucm.es

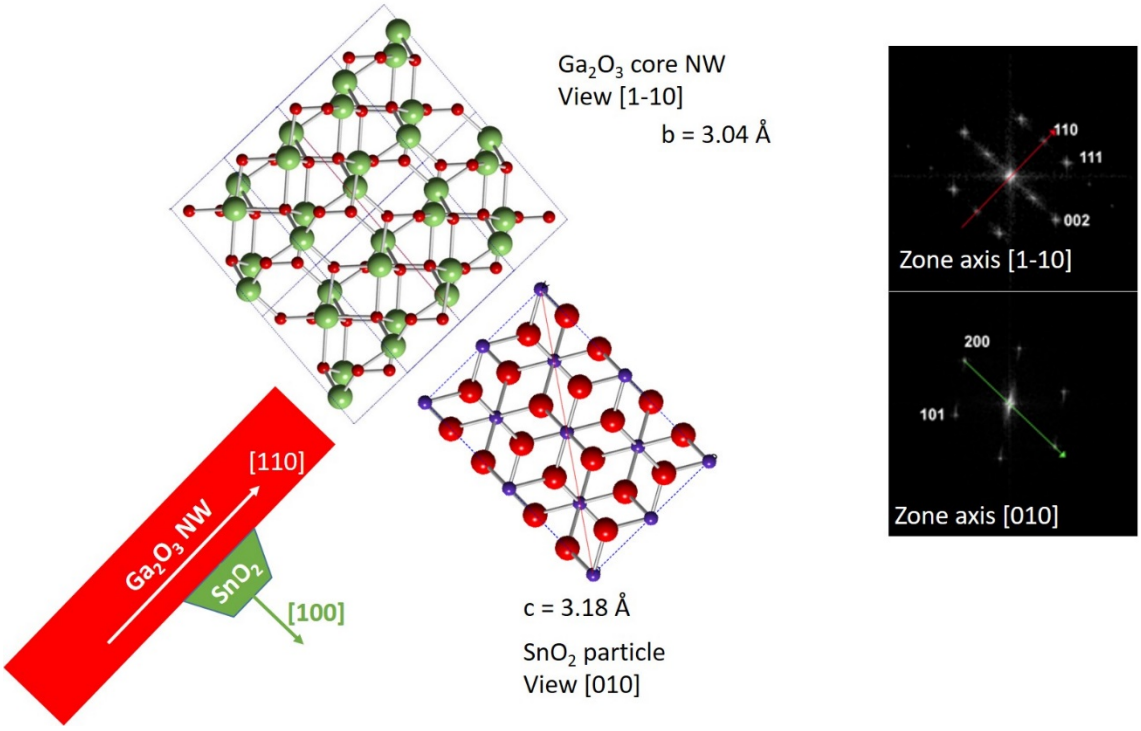
ASSOCIATED CONTENT

Supporting Information.

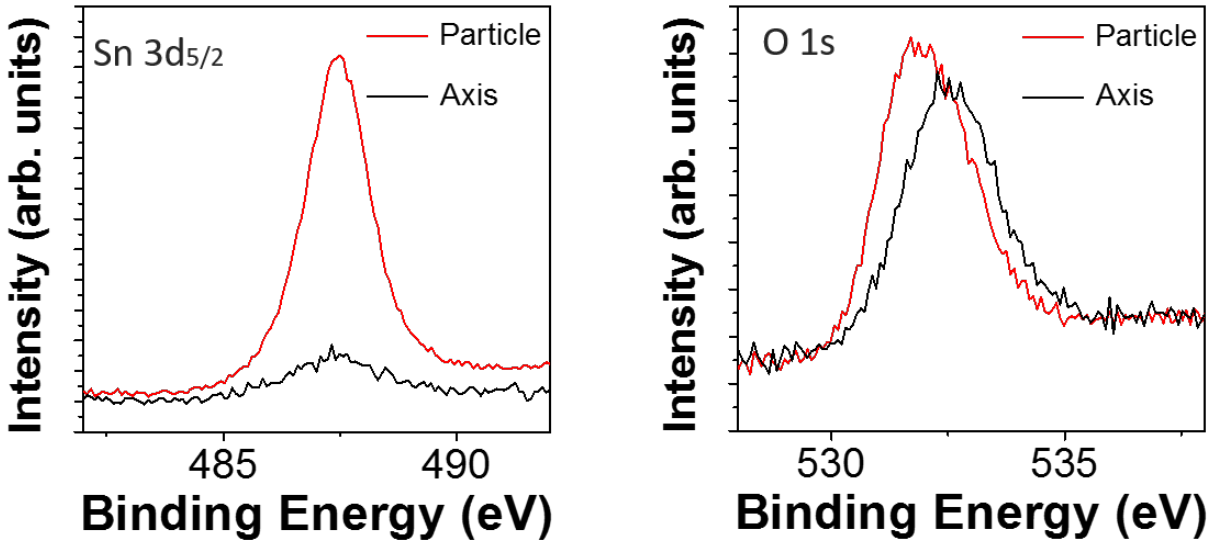
S1. Animated sequence of photographs taken at the end of the quartz tube where the growth takes place. The labels indicate the real time. When the furnace reaches the targeted temperature, a burst of nanostructures is clearly produced.



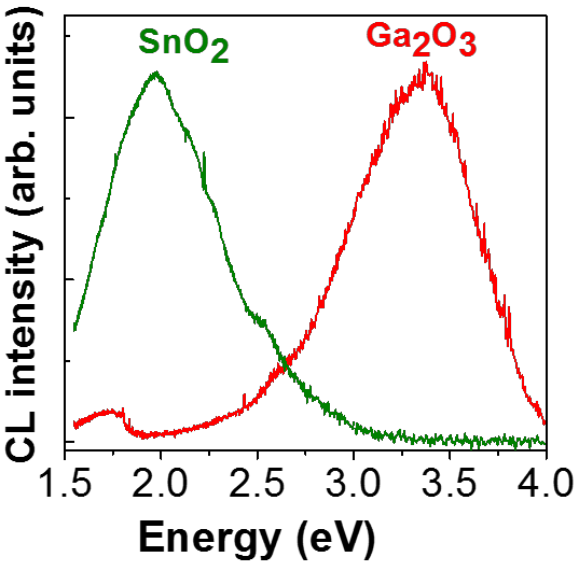
S2. Left: TEM image of the moiré fringes at the SK structures. Right: FFT transform of the dashed square. Some diffractions spots originated from the moiré fringes are highlighted by a red circle.



S3. Ball stick model for the junction between NW and nanoparticles. SnO_2 crystal: red balls are oxygen atoms, blue balls Sn atoms. Ga_2O_3 crystal: Green balls are Ga atoms and red balls are oxygen atoms.



S4. XPS spectra of the Sn 3d $_{5/2}$ and O 1s core levels in the skewer-like structures. Red lines correspond to spectra recorded at SnO_2 particles and black lines to the Ga_2O_3 axis. Sn 3d peak at 487 eV is the characteristic in SnO_2, and weak in the axis. On the other hand, O 1s level is composed of several components. The lower energy compound is assigned to Sn-O bond, while the higher component is assigned to Ga-O-Ga bonds. Ref: 29.



S5. CL spectra of bulk Ga_2O_3 and SnO_2 used as references.