Supplementary information

Arrays of Nanorods Composed of ZnO Nanodots Exhibiting Enhanced UV Emission and Stability

Yongqi Yin, Ye Sun*, Miao Yu*, Xiao Liu, Bin Yang, Danqing Liu, Shaoqin Liu, Wenwu Cao and Michael N R Ashfold*

Suggested reaction scheme for the chemical processes occurring in this work:

Formation of ZnO nanorods (NRs):

$$Zn^{2+} + 2OH^{-} \leftrightarrow ZnO + H_2O \tag{1}$$

Condensation reaction to form ZnO nanodots (NDs):

$$\equiv Zn - OH + OH - Zn \equiv \leftrightarrow \equiv Zn - O - Zn \equiv + H_2O$$
⁽²⁾

Silica formation from TEOS:

Hydrolysis:

$$\equiv Si - OR + H_2O \leftrightarrow \equiv Si - OH + ROH$$
(3)

Condensation:

$$\equiv Si - OH + HO - Si \equiv \leftrightarrow \equiv Si - O - Si \equiv + H_2O$$
(4)

Condensation yielding an alcohol:

$$\equiv Si - OR + HO - Si \equiv \leftrightarrow \equiv Si - O - Si \equiv + ROH$$
(5)

Condensation reaction to form a passive surface with the ZnO NDs:

$$\equiv Zn - OH + OH - Si \equiv \leftrightarrow \equiv Zn - O - Si \equiv + H_2O$$
(6)



Figure S1. (a) TEM and (b) HRTEM images of ZnO NRs treated with 50 μ L of TEOS.



Figure S2. Diameter distribution of the ZnO NDs inside the ZnO/SiO₂ NRs.



Figure S3. PL spectra of as-grown ZnO NRs and of NRs after O₂ and Ar plasma treatment.



Figure S4. PL spectra of as-grown ZnO NRs and of NRs after annealing in O₂ and Ar.



Figure S5. Plot showing the time dependence of the relative UV emission intensity of the as-grown ZnO NRs and the TEOS-treated ZnO NRs immersed in an aqueous buffer solution at pH = 9.18.



Figure S6. PL spectra of as-grown ZnO NRs and of the silica powder formed by hydrolysis and condensation of TEOS.



Figure S7. PL spectra of SiO_2 powder formed by hydrolysis and condensation of TEOS recorded at room temperature and after annealing in O_2 at 300, 600 and 900 °C.