Electronic supplementary information for

Au-NRs /VO_2-NPs nanocomposites supported on glass substrates: Microstructure and optical properties

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Manufacturing of self-standing metallic Nanorods.

For the processing of AAO films quartz glass substrates were first cleaned by sonication in isopropanol and dried before introduction into a PVD chamber with 3 sputter targets and an e-beam evaporation crucible. A metallic layer stack consisting of 2nm Ti as adhesion layer, 10nm Au electrode and 1µm Al was fabricated by RF-sputtering (Ti and Au) and e-beam evaporation (Al) in the same chamber without breaking the vacuum in order to ensure high film adhesion to the substrate and a smooth Al film, both are prerequisites for a successful anodization. One-step anodization was conducted in 0.3 Mol/l oxalic acid at 40 V. Anodization was completed in approximately 5 minutes. Subsequently pore widening and barrier layer opening were performed in 5% H_3PO_4 at room temperature for 60 minutes. After the electrochemical deposition of the Au-NRs the AAO template was disolved in 2% NaOH for 20 minutes. Figure 1s schematically shows the fabrication steps of the template and electrodeposition of metallic Nanorods (NRs) on substrate.

For Au-NRs electrodeposition a 50 mM aqueous solution of $HAuCl_4.3H_2O$ (Roth, Germany), with pH = 2, was used with an electrochemical work station (Zhaner, Germany) at 200 mV deposition voltage. After dissolution of the PAF the substrate was introduced into the sputtering chamber and vanadium was RF sputtered on the Au-NRs using an elemental vanadium target (Kurt Lesker Company, UK) under an approximate Argon partial pressure of 10^{-3} mbar. The film thickness was monitored by a quartz crystal microbalance.

Figure legends

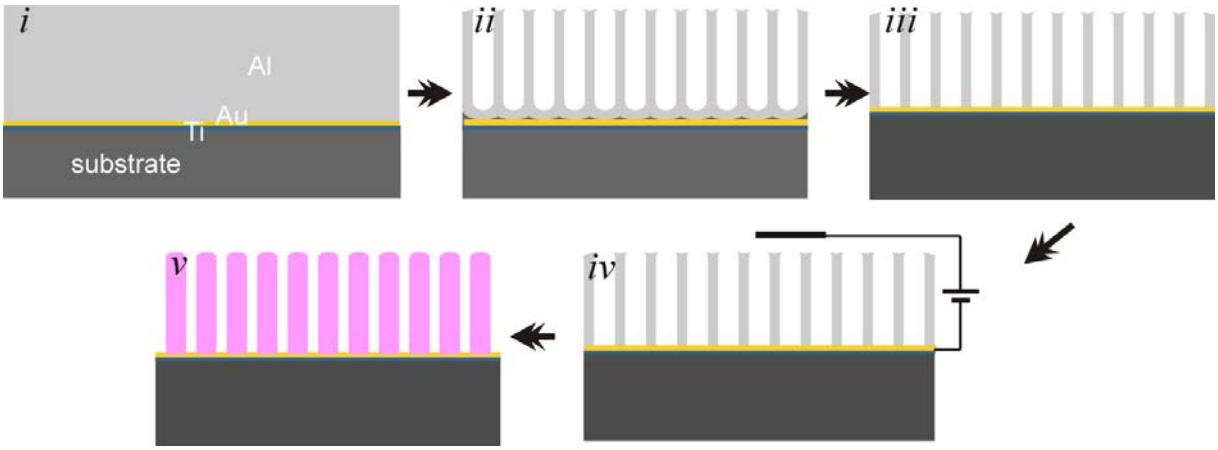
Fig.1s The Processing steps of the manufacturing of self-standing metallic Nanorods.

Fig. 2s (a) SEM image of Au-NRs on glass showing large and homogenous growth, (b) 10 nm sputtered vanadium caps on the Au-NRs, (c) SEM (tilt view) and (d) EDX of VO_2 caps obtained from 5 nm sputtered vanadium and subsequent annealing.

Fig. 3s. Diffraction XRD in Grazing incidence mode of VO_2-NPs on Au-NRs obtained after annealing 5 and 10 nm of sputtered vanadium on Au-NRs. Thick marks denote the reflex positions for the monoclinic VO_2 phase with the P21/c (PDF Ref. Code 00-009-0142).

Fig. 4s Forward and backward transmittance as function of temperature at a wave length of 1100 nm for 5 nm VO_2 on Au-NRs. The inset shows the derivative of the hysteresis loop to determine the phase transition temperature.

Fig. 5s Schematic energy diagrams showing Au-NR and VO_2-NP before and after heterojunction. Band bending and electron rich interfacial zone are shown on the right diagram.



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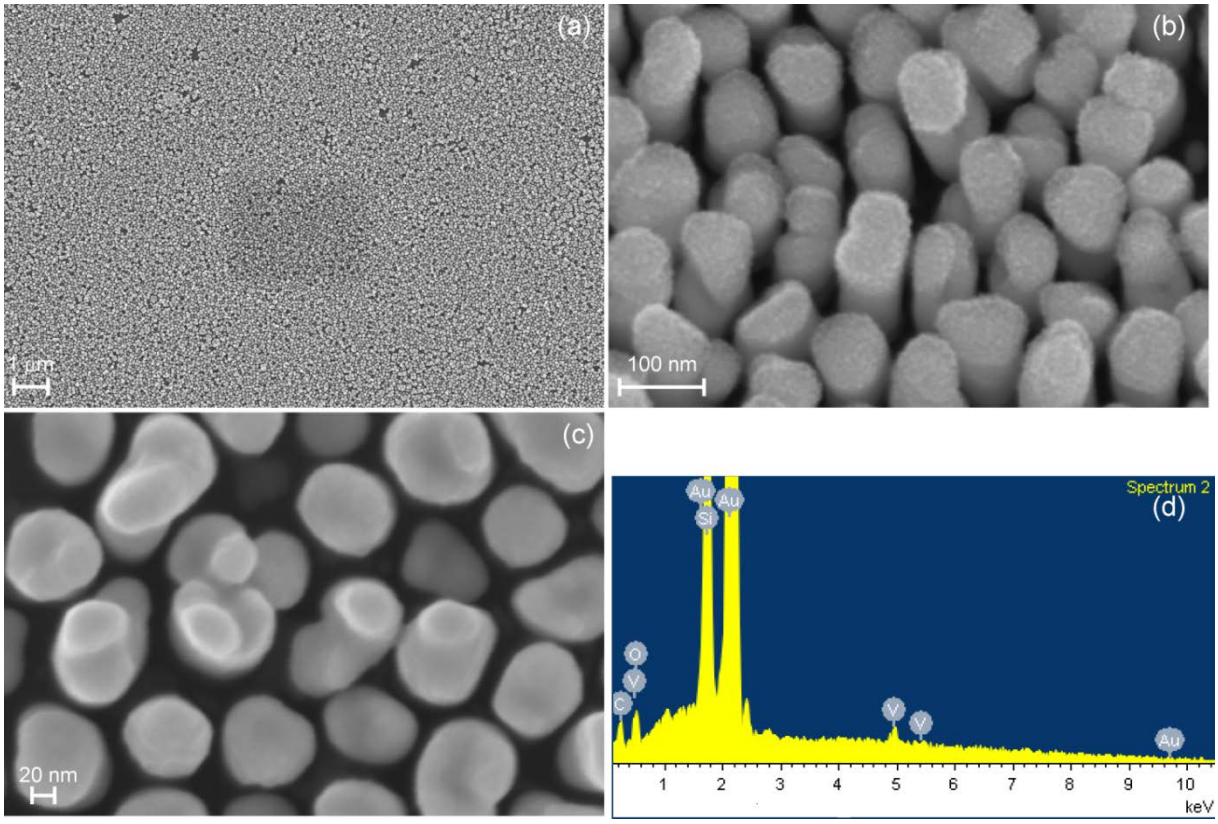

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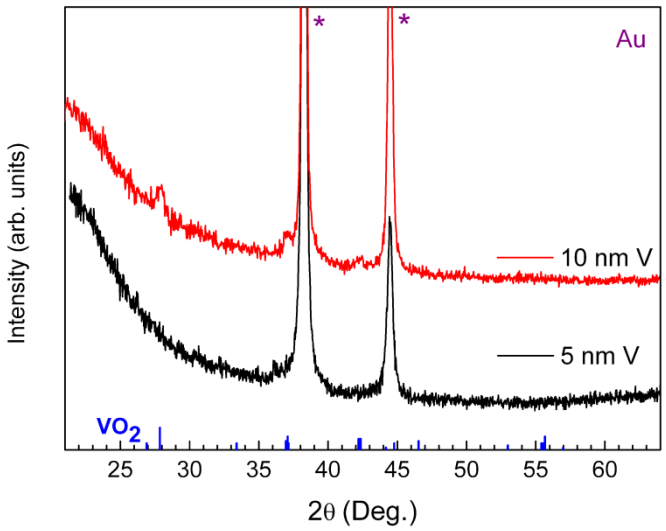

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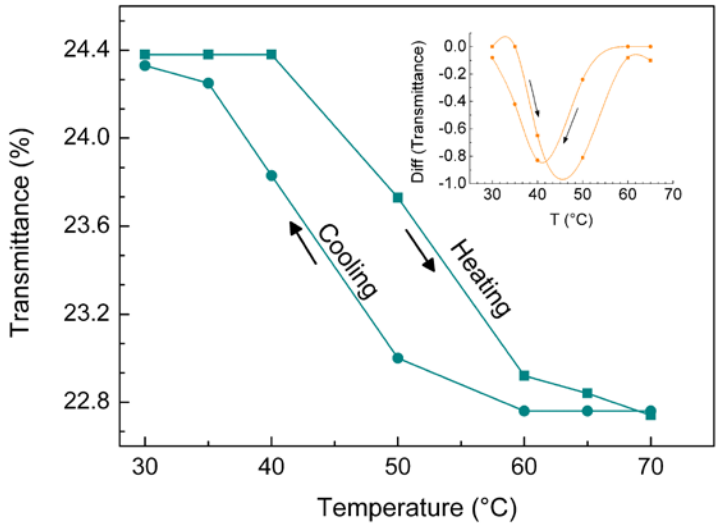
The XRD spectroscopy analysis (Fig. 3s) of the 10 nm sputtered Vanadium thin film shows after annealing very weak and broad reflexes at 27.8, 37.2 and 42.4 (2θ) corresponding to VO_2



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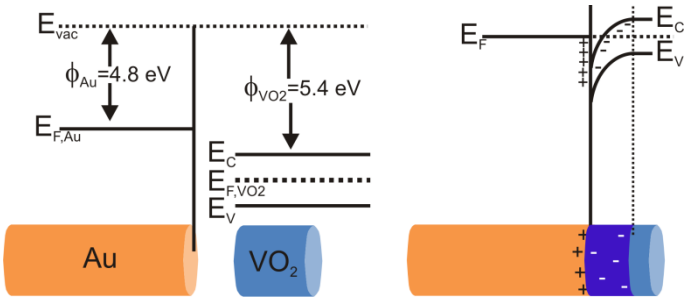

Fig. 5s Schematic energy diagrams showing Au-NR and VO_2-NP before and after heterojunction. Band bending and electron rich interfacial zone are shown on the right diagram.[15,16]