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Wettability switching of ZnO nano-wires from super-hydrophilic to super-hydrophobic state using reducing/oxidizing gas treatments

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Here, a simple, fast and effective approach for controlled reversible wettability switching of ZnO nano-wires (NWs) from superhydrophobic to super-hydrophilic state is demonstrate. ZnO NWs were synthesized by chemical vapor deposition (CVD) method. The as-synthesized ZnO NWs are super-hydrophilic in nature with contact angle (CA) value of 0°. The as-synthesized ZnO NWs were annealed in H2 gas (50sccm) atmosphere for 1.5 hour at 300°C. After H2 gas annealing treatment, the sample becomes super-hydrophobic with CA value of 153.5°. On the other hand, if the super-hydrophobic ZnO NWs were annealed in O2 gas (50sccm) atmosphere for 1 hour at 300°C the sample becomes super-hydrophilic. Figure 1 shows the reversible wettability switching of ZnO NWs with alternative H2 and O2 gas annealing treatment. The results indicate that the ZnO NWs surface with rare oxygen vacancy defects is more favorable for water wetting. The super-hydrophobic ZnO NWs coating can be utilized to prepare super-hydrophobic transparent substrate with more than 70% transparency.

Biography

J P Singh has completed his PhD from Inter University Accelerator Center, New Delhi and Post-doctoral studies from Rennselaer Polytechnic Institute, NY. He is currently an Associate Professor at IIT Delhi, India. He has published more than 75 papers in reputed journals and won many national and international awards.

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