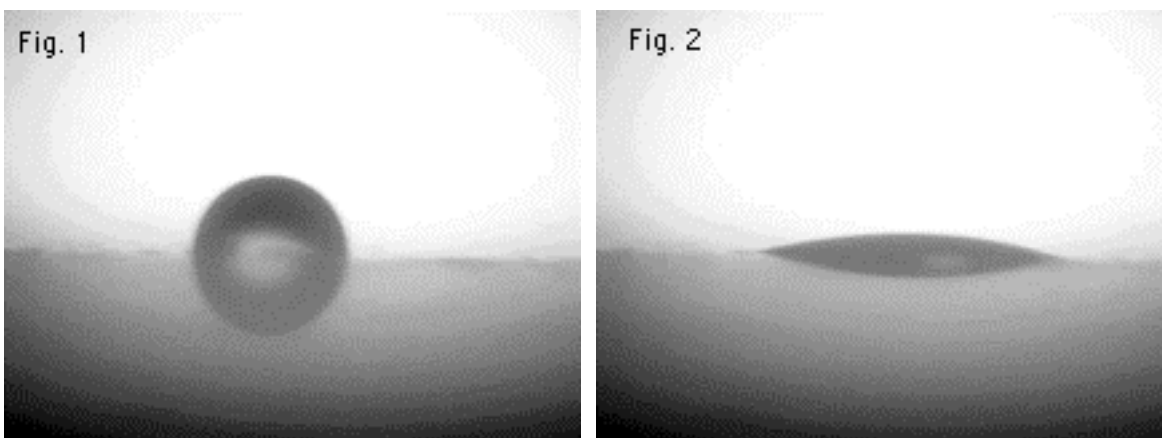


## Light-Controlled Surface Energy Switching on Zinc Oxide Nanorods Modified with para-Methyl Red

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Zinc Oxide nanorod arrays demonstrate dramatic modification of their aqueous wetting properties as the coverage of terminal hydroxyl groups on the tip of the nanorods is changed<sup>1</sup>. These arrays can also be made super-hydrophobic through surface functionalization by self-assembled monolayers, such as occurs with stearic acid<sup>2</sup>. We have followed this theme to attach para-methyl red (p-MR, 4-dimethylaminoazobenzene-4'-carboxylic acid) to ZnO nanorods, using the same carboxyl-group chemistry. The nanorod arrays were synthesized by hydrothermal aqueous solution growth from zinc acetate on 500 nm-thick ZnO films, grown by RF sputtering on glass substrates. The individual single-crystal rods were 1  $\mu\text{m}$  long and 100 nm in diameter, with a c-axis orientation. The molecule p-MR engages in light-driven isomerization. In the ground state (trans configuration) the nanorod tips are terminated with



methyl groups, leading to large contact angles (Fig. 1). If the surface is exposed to UV light from 405-nm LEDs the p-MR layer adopts a photostationary state with a higher concentration of molecules in the cis configuration. In that condition the dimethyl end is rotated away from the surface normal, exposing the azo linkage. The resulting higher surface energy leads to a dramatically reduced contact angle (Fig. 2). We have characterized the spectral properties of these layers, and have preliminary information about the photoisomerization dynamics.

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