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Growth of TiO_2 NWs by OAD technique

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I. INTRODUCTION

It is a challenging task to fabricate high quality TiO2 nanowires (NWs) using vapour transport technique, which is different from vapour-liquid-deposition [1]. We have demonstrated the comparative study between TiO2 NW and TiO2 NW covered with plasmonic metal (Ag) nanoparticles (NPs) based optical detector for the UV detection. The nanowire was fabricated due to self-shadowing mechanism through oblique angle deposition (OAD) under the vapour transport process in the horizontal quartz tube inside the two zone tube furnace. The Ag nanoparticles were deposited on TiO2 NW by Glancing Angle Deposition Technique (GLAD) incorporated thermal evaporator system. The scanning electron microscopy (fig.1) reveals the growth of TiO2 NW and Ag NPs dispersed TiO2 NW.

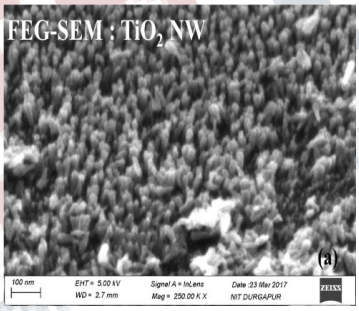

Fig 1 (a) Tilt view TiO2 NW/Si sample

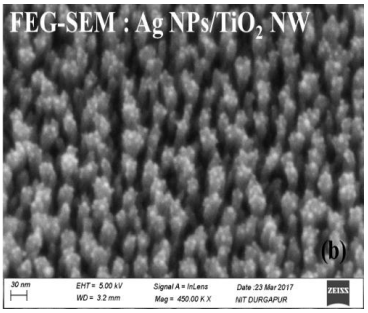

Fig1 (b) Tilt view of Ag NPs/ TiO2 NW/Si sample.

The Dark Current Vs Voltage (V) graph possesses the rectifying behavior of both the detector. The reverse Current (I)-Voltage (V) relation under dark and UV (320 nm) illumination shows the Ag NPs/TiO2 NW plasmonic device shows more light sensitivity as compared to bare TiO2 NW device. The ratio of light and dark current (fig. 2) is larger for plasmonic device (Ag NPs/TiO2 NW) i.e 1.25 as compared to bare TiO2 NW based detector.

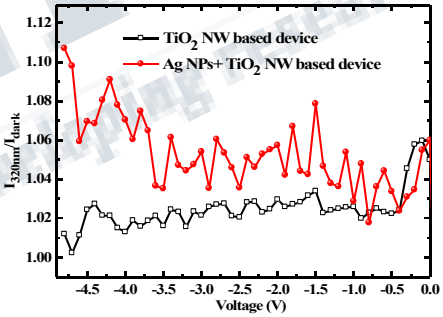

Fig. 2 Ratio of UV light current/ dark current of bare Au/TiO2 NW and Au/Ag NPs/TiO2 NW device

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