TiO2 Protected Silicon Nanowires for Water Splitting.

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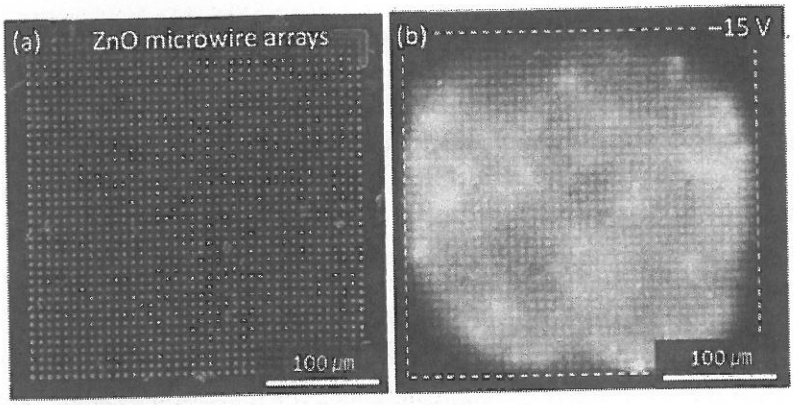

Fig 1. (a) Plan-view SEM image of position-controlled *n*-ZnO microwire arrays grown on pre-patterned *p*-GaN film and (b) the corresponding EL emission photomicrograph.

1. S. M. Sze, *Physics of Semiconductor Device*, 3rd ed. (Wiley, New York), (2007).

P03: TiO_2 Protected Silicon Nanowires For Water Splitting

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Owing to optical properties, silicon is an almost ideal material for solar applications. Moreover, when the silicon is deposited in a form of silicon nanowires (SiNWs), total absorption over visual range of wavelengths is immensely increased due to multireflection inside a nanowire based film.

We succeeded to prepare SiNWs with a specific structure: external amorphous jacket and a thin inner crystalline core (Fig. 1) [1]. The amorphous jacket serves as absorption medium whereas the inner jacket as a drain electrode for free charge carriers. Experiments showed that this film is capable of splitting water via photon absorption. However, at the same time chemicals and photo-induced electrochemical processes have some detrimental impact on SiNWs.

To prolong a lifetime of a SiNW based film device for water splitting, we deposited a thin TiO_2 layer onto SiNWs so as to prevent an access of electrochemical medium to SiNW surface. Such prepared film was tested and analyzed by several techniques (SEM, EDX, XPS, TEM, Raman spectrometry, cyclic voltammetry).