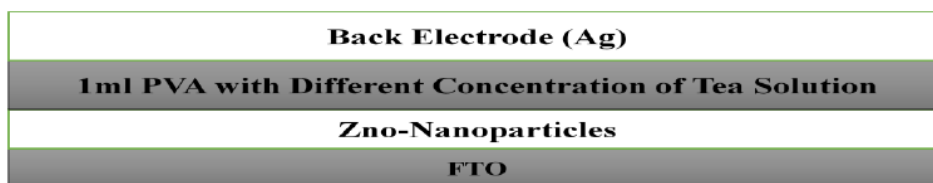


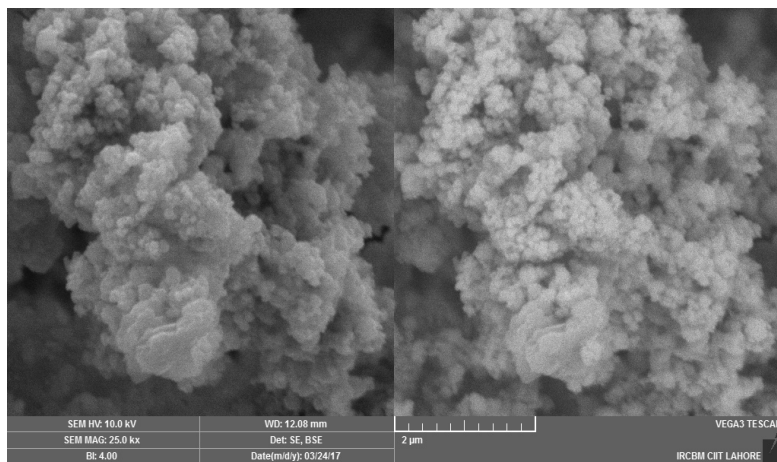
## Abstract

Organic solar cell technology is very low cost, reliable and efficient technology. In this work, we have studied the performance of single layer hybrid organic solar cell, which is based on polyvinyl alcohol (PVA) doped with Camellia sinensis (Black Tea) solution and Zinc Oxide (ZnO) as plasmonics nanoparticles to scatter more light into active layer of solar cell. The broad absorption spectra of the composite material (PVA and tea solution) with various concentrations ranged from UV to visible region. Its energy gap was measured which allowed trapping a large portion of the incident solar light. The band gap is reduced upon the addition of Camellia sinensis (Black Tea) because the addition of Camellia sinensis (Black Tea) caused PVA to get more ordered structure. Characterization of ZnO nanoparticles using XRD and SEM confirmed the hexagonal wurtzite structure and spherical surface morphology of nanoparticles. Six solar cells were fabricated based on various concentrations of PVA doped with Camellia sinensis (Black Tea) solution using silver paste/graphite as counter electrodes, with and without ZnO nanoparticles thin film. The current-voltage (IV) characteristics curves of the fabricated organic solar cells were measured. The IV curves were studied of all solar cells that gave the following efficiencies 0.0216%, 0.0364%, 0.34%, 0.42%, 0.564 and 0.729%. The maximum energy conversion efficiency was calculated to be 0.7%, for an organic solar cell having high concentration of camellia sinensis, with ZnO nanoparticles thin film and silver paste as a counter electrode.

**Key Words:** Hybrid organic cell, polyvinyl alcohol, Camellia Sinensis, ZnO nanoparticles.

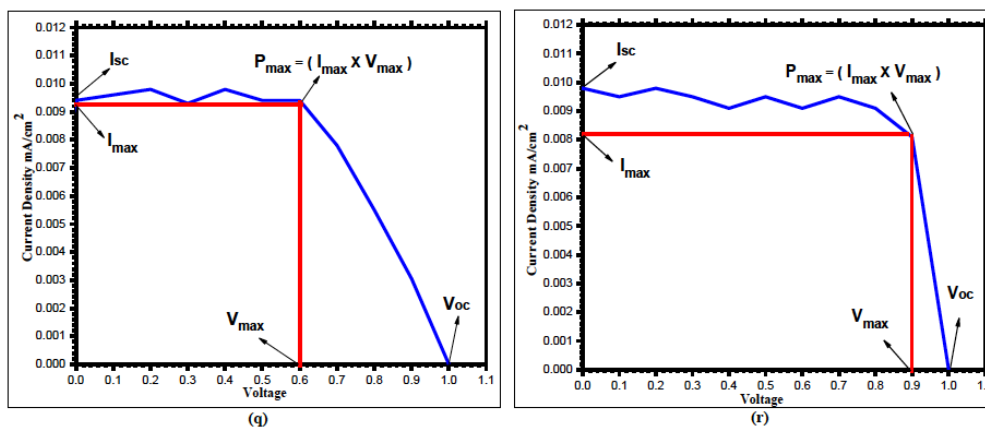
### Schematic of Single Layered Organic Solar Cell





**Fig. SEM Images of ZnO Nanoparticles**

**IV Curves:**



**Fig: (q) IV curve of 1ml PVA Gel, 10ml Camellia Sinensis and (r) 50ml Concentration of Camellia Sinensis with Ag (Silver Paste)**

**Table: IV Analysis of Solar Cells with ZnO Nanoparticles and Ag (Silver) Electrode**

Sr. No	Solar Cell Schemes	I <sub>sc</sub> (mA)	V <sub>oc</sub> (Volts)	P <sub>max</sub>	Fill Factor	Efficiency	%Efficiency
1	ITO-ZnO-PVA-10ml Tea-Ag	0.0094	1	0.00564	0.6	0.00564	0.564
2	ITO-ZnO-PVA-50ml Tea-Ag	0.0098	1	0.00729	0.7438	0.00729	0.729