**Link:** <https://solar-power-tech.com/e-posters/dsc_eposter_04/>

**Abstract**

Dye-sensitized solar cells (DSSC) are cheap, aesthetic and stable photovoltaic devices which allow decent PCE of ca 13% under 1-Sun illumination and amazingly high PCE of ca. 35 % under artificial light [1,2]. Back electron recombination in the TiO2/electrolyte interface is one of major hurdle of DSSCs technology. Co-adsorbents are typically used to suppress the back-electron recombination and to avoid dye aggregation [1, 3-5]. In this work [5], several Poly(4-vinylpyridine) (P4VP) homopolymers of different molecular weights (MW) were prepared by Reversible Addition-Fragmentation Chain Transfer polymerization and studied as co-adsorbents with N719 dye. FTIR spectroscopy showed that P4VP adsorbs on the titania surface by coordinative bonding to the Lewis-acid centers of the TiO2 and block pathway for electrons to recombine with electrolyte, as supported by EIS and photocurrent response of the devices. Two different adsorption protocols of the P4VP on TiO2 were explored in details: simultaneous and sequential adsorption. With twofold less dye adsorbed comparatively to the reference, the simultaneous adsorption of P4VP with N719 allowed increasing the PCE from 5.4 % reference to 7.5 % under 1-Sun. It was demonstrated that the sequential adsorption of P4VP and N719 promotes a strong covalent bonding of the dye on the titania; electron injection from dye to TiO2 was drastically improved. Consequently, a device with as high PCE as 9 % under standard 1 Sun illumination was produced for the first time ever using polymeric P4VP co-adsorbent. Furthermore, under artificial 500 and 1000 lx light the devices obtained display as high PCE as 22.4% and 22.5%, respectively. During 250 h of natural ageing tests the DSSCs with P4VP co-adsorbent show perfect stability of the photovoltaic metrics. It makes a simple and cheap P4VP molecule a very attractive alternative for conventional CDCA to produce efficient and stable DSSCs.