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# DIAMONDOID COUNTER ELECTRODES FOR DYE-SENSITIZED SOLAR CELLS

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Dye-sensitized solar cells (DSSCs) are a leading contender for low-cost solar energy generation. The highest efficiency of DSSC is from platinum(Pt) counter electrode (14.1%), however platinum is very expensive and there are other materials that can use as counter electrode such as conductive polymer, carbon nanotube and other carbon form. In this work we use diamondoids (nano powder of diamond) which exhibit negative electron affinity property, enabling the better transfer of electrons back to DSSC. We prepared counter electrodes by using diamondoids with –thiol function and applying the self-assembly monolayer technique on gold and platinum substrate. We fabricated working electrodes by using TiO2 coated on FTO glass and immersing it in N719 dye. For electrolyte we used iodine electrolyte as media collector. The efficiency of the DSSC with adamantane (smallest molecule of diamondoids) film is close to one with the reference cell Pt film. The large enhancement comes from the DSSCs with tetramantane films which give efficiency as high as 10.95%, comparing to the reference Pt cell with efficiency of 8.55%; this increase is approximately 25%. However, we still have some problem with this technique. Iodine electrolyte destroys the gold substrates and shortens the cell lifetime greatly. Then we try to deposit diamondoids films on platinum substrate and found that diamondoids can enhance efficiency of platinum slightly with very high stability as platinum. Irrespective of the exact microscopic mechanism driving this, our results already reveal exciting, but hitherto unappreciated, possibilities for the use of diamondoids in dye-sensitized solar cells. We expect our findings to be of relevance to perovskite-based solar cells. More generally, our approach offers an attractive and low-cost route to exploit diamondoids in a range of applications in other catalytic processes.

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