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The effect of pH of a new PAMAM dendritic material on the performance of organic bilayer solar cells

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Converting sun light to electricity using solar harvesting devices is one of the solutions to reduce the world dependence on the fossil fuel. Due to the importance of harvesting solar energy, the continuous development of solar cells is one of the most important developments in the conversion of solar energy. Recently, organic solar cells show many advantages over inorganic devices such as lightweight, flexibility, low cost and variety materials synthesis with different structures. However, organic solar cells efficiency is still below 10% and it is affected by many factors such as the choice of materials and fabrication techniques. Dendrimers are a new class of polymeric materials that are composed of highly branched, well-defined and nature monodisperse macromolecules, which can support the charge transport and film morphology. Multifunctional Polyamidoamine (PAMAM) dendrimers as flexible light harvesting antennae with high efficiency electron transfer was used as the acceptor while poly (3- hexylthiophene) (P3HT) was used as donor due to their low band-gap and efficiency in organic photovoltaic applications. This work investigate the effect of pH of the new PAMAM dendritic wedge (G0.5) salt on the organic bilayer solar cells in order to improve their performance and morphology. The structure with G0.5 salt at neutral pH 9.02 level resulted in much improved surface morphology and enhances the charge mobility. It was also observed that the organic hetrojunction structure shows high open circuit voltage of about 0.85 V, a short circuit current of 1 mA/cm^2 and power conversion efficiency of 1.1%. The results show that at neutral pH 9.2 the PAMAM G0.5 salt exhibit a major peripheral distribution where in the low pH <5 the surface shrink.

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