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New Fluorene-Based Hole Transporting Organic Semiconductors for Efficient Hybrid Solar Cells

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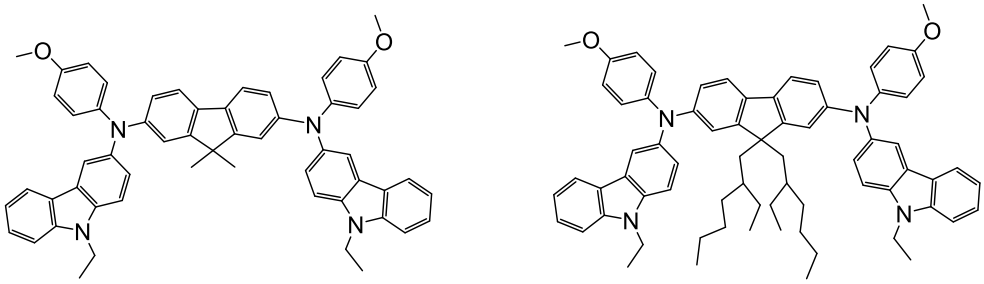
Solar energy is the most powerful source of renewable energy. Properly refined Solar cells can fully meet society's energy needs. Currently, silicon Solar elements (SEs) is mainly used, but it is expensive and complicated to produce. However, the use of organic and hybrid SEs is growing rapidly. The efficiency of perovskite Solar cells (PSCs) have already exceeded 22% [1]. These elements are characterized by simple construction and cheap raw materials. While PSCs have achieved record efficiencies (3.8% to 22.7%) over the last five years [2], there are still several obstacles to their commercialization. In particular the rather expensive p-type organic semiconductor (spiro-OMeTAD) used for hole transport is synthesized by a five step reaction, and also the unresolved stability problem of these devices. Currently, there is an intense search for more simple synthesis methods to produce cheaper and efficient semiconductors. The aim of this work was to synthesize fluorene-based semiconductors, that could be used as a hole transporting material in PSCs, and estimate the influence of the length of alkylchains on the properties of new compounds.



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1. Fig. New fluorene-based compounds.

During this work new fluorene class compounds were obtained. From investigated optical properties, it is evident that all compounds have two maximum absorption peaks between 303 and 377 nm. All target substances are amorphous and have thermal stability greater than 400 °C. It has been observed that ionization potential and hole drift mobility of compounds is favorable for the use in Solar cells as positive charge carriers.

REFERENCES

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