photoanodic material of DSCs. EIS investigation showed that the MOF-199 coated TiO_2 structure is essential to reduce the charge-transfer resistance of the TiO_2/ MOF/ electrolyte interface. The MOF-based solar cell devices were fabricated by using the screen-printing method and optimization was done through layer thickness, the ratio of MOF:TiO_2, and the type of electrolyte. These novel photoanode-based SCs exhibited 0.004% efficiency (η) and the conductivity and light absorption capacity were improved by adsorption of Rhodamine G6 to that structure. It leads to significant improvement in cell efficiency (η = 0.022%) with *V*oc = 0. 44 V, *J*sc = 0.1 mA cm^{-2} , and FF = 0.42.

Keywords: Metal-organic frameworks, Sensitizer, Post-synthetic modification, TiO_2

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Pyrolysis of waste polypropylene to fuel oil

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Plastic waste accumulation in the environment has increased rapidly. This is mainly due to their versatile properties, which allow them to be used as substitutes for wood, metals, ceramics, and glass. They have diverse applications, as they are light-weight, durable, cost-effective, and stable products. However, the world is experiencing the adverse effects of plastic debris in the environment due to plastic waste mismanagement. Pyrolysis of plastic has been identified as an effective method of plastic waste management by converting the waste into fuel oil, char, and gases. The pyrolysis of waste polypropylene (PP) using a low-cost, simple lab-scale apparatus in the presence and absence of catalysts is discussed here. In the current research, the efficiency of the catalyst, Zeolite Socony Mobil-5 (ZSM-5), in pyrolysis process was investigated. The generated volatile products were condensed into resultant liquid oil. Active carbon filters and organic solvents were used to trap the non-condensed gas fraction to prevent possible atmospheric pollution. The non-catalyzed pyrolysis of PP resulted a high liquid yield of 79.57 ± 1.66 wt. % with a low gaseous yield (14.64 ± 0.84 wt. %) at 330 °C while the ZSM-5 catalyzed process reduced the liquid yield to 56.88 ± 2.29 wt. % and increased the gaseous yield (38.13 ± 1.88 wt. %) at 280 °C. Then resultant liquids were fractionated based on the boiling points of several petroleum fractions (naphtha, kerosene, and diesel) and each fraction was analyzed by GC-MS to identify the constituent compounds. Accordingly, the non-catalyzed pyrolysis produced 3,3,5-trimethyl-heptane ($C_{10}H_{22}$), 4-methyl-2-undecene ($C_{12}H_{24}$), 1-dodecene ($C_{12}H_{24}$), and 2-methyl-1-hexadecanol ($C_{17}H_{36}O$) while the catalyzed pyrolysis with the ZSM-5 resulted 1-ethyl-2-methyl-benzene (C_9H_{12}), 3,3,5-trimethyl-heptane ($C_{10}H_{22}$), (Cyclopentylmethyl)-cyclohexane ($C_{12}H_{22}$), and n-Nonylcyclohexane ($C_{15}H_{30}$) as the major constituents.

Keywords: Pyrolysis, polypropylene waste, catalyst, GC-MS, fuel oil

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