**Supporting Information**

* **Synthesis of C14MC-MA-HE terpolymers**
* **Synthesis of tetradecyl methacrylate (C14MC)**

The tetradecyl methacrylate was synthesized by the reaction of methacrylic acid and 1-tetradecanol in a molar ratio 1.2:1, using toluene as solvent, hydroquinone as inhibitor, PTSA as catalyst, and water was separated azeotropically using Dean-Stark apparatus. When the reaction ends, the crude products were washed for several times with an aqueous solution of Na2CO3 (5% m/V) until the underlayer of liquid was clarified. The products then washed with distilled water for several times until the products is neutral, and then the products were vacuum-distilled using a rotary evaporator and vacuum-dried. The end products C14MC obtained were either a light yellow or milky white latex substances.The synthesis routine of tetradecyl methacrylate was shown in Figure S1.



**Figure S1.** The synthesis routine of tetradecyl methacrylate

**1.2. Synthesis of terpolymers**

First, a three-neck round flask was fitted with a condenser, a temperature controller, a magnetic stirrer, and a nitrogen-controlled inlet valve. And then this flask was filled stepwise with C14MC, MA, HE and toluene solvent at a certain molar ratio. Nitrogen gas was flushed through the flask for 30 min, while the reaction mixture was gradually heated. When the temperature of the reaction reached 95 °C, benzoyl peroxide which dissolved in toluene as an initiator was added drop by drop for 30-45 min and the whole reactants was refluxed for 6.5 h. When the crude product had cooled to room temperature, excess methanol was added to the reaction system; white precipitate was obtained after filtration and then added to the toluene solvent. The purification process was repeated three times. After rotary evaporation, the terpolymers were obtained and vacuum-dried for 24 h. The synthesis routine of terpolymers was showed in Figure S2.



**Figure S2.** The synthesis routine of C14MC-MA-HE terpolymers

**2. Characterization of the chemical structures of the PPDs**

**2.1. Fourier Transform Infrared (FTIR) Spectroscopy**

The FTIR spectra of the prepared monomer and terpolymers are shown in Figure S3. In Figure S3(a), the stretching vibration peaks of CH3– and –CH2– is at 2925 and 2854 cm−1,and the deformation vibration peak is at 1465cm-1, the typical swing absorption peaks of characteristic –CH2– in long-chain alkyl are detected at 720 cm−1; the characteristic C=O strong stretching vibration peak of ester group is at 1722 cm−1, the characteristic C-O-C strong absorption peak of ester group is at 1165cm−1; and the characteristic C=C stretching vibration peak is at 1640 cm−1, the characteristic -C=CH2 deformation vibration peak is at 939 cm−1. The characteristic C=O stretching peaks of MA at 1856 and 1780 cm−1 was displayed in Figure S3(b), and the characteristic C=C stretching vibration peak at 1640 cm−1 almost disappears completely. This result indicates that terpolymers are synthesized successfully.



**Figure S3**.The IR spectra of (a) C14MC and (b) C14MC-MA-HE

**2.2. Proton nuclear magnetic resonance (1H NMR)**

The chemical structures of the prepared C14MC and C14MC-MA-HE were characterized by 1H NMR analysis. The typical 1H NMR spectra of the prepared monomer and terpolymers are presented in Figure S4. As shown in Figure S4(a), the chemical shifts of the two H atoms on the double carbon bond are 5.548 and 6.108 ppm. Furthermore, the H of the methylene group adjacent to the oxygen atom of tetradecyl shows a chemical shift of 4.134-4.161 ppm. The H of the methyl group adjacent to the double carbon bond shows a chemical shift of 1.955 ppm. The H of the methylene group adjacent to the methylene, which is adjacent to the oxygen atom of tetradecyl, presents a chemical shift of 1.652–1.707 ppm. Moreover, the H in the long-chain methylene bands exhibits a chemical shift of 1.273–1.395 ppm, and the chemical shifts for the methyl groups are in the range of 0.880–0.907 ppm. The H of the polymeric-state MA in Figure S4(b) shows a chemical shift of 2.827 ppm with a subtle, non-evident peak compared with that in Figure S4(a). The peak of the two H atoms on the double carbon bond disappears, and the peak area of long-chain methylene bands in Figure S4(b) is large. These results indicate that the desired products are synthesized successfully.





**Figure S4.** 1H NMR spectra of C14MC (a), C14MC-MA-HE (b)

**2.3. Gel permeation chromatography (GPC)**

GPC was used to determine the molecular weight and polydispersity index of the prepared PPDs. THF was used as mobile phase at a flow rate of 1 mL/min. The standard substance was polystyrene.

**3. Measurements of compositions of diesel fuel**

The Shimadzu GC-MS QP2010SE was used to analyze the carbon number distribution of n-alkanes in the 0#diesel fuel. An HP-88 column (30m×0.25mm×0.25μm) was used, and the capillary column temperature was increased from 60 °C to 260°C at 5 °C/min. Both the interface temperature and injector temperature were 290°C; and a high-purity helium carrier (100:1) was used at 1 mL/min.