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Supplementary Information

Preparation and Characterization of Side-chain Liquid Crystal
Polymer/paraffin Composites as Form-stable Phase Change Materials

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Synthesis of the monomers

6-((4'-(octadecyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC18): Yield: 75%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.94 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 1.95 (s, 3H, -CH₃), 1.84-1.77 (m, 4H, -CH₂-), 1.76-1.71 (m, 2H, -CH₂-), 1.54-1.42 (m, 6H, -CH₂-), 1.41-1.21 (m, 28H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₄₀H₆₂O₄, 606.92; found 606.552.

6-((4'-(hexadecyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC16): Yield: 69%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.94 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 1.95 (s, 3H, -CH₃), 1.85-1.76 (m, 4H, -CH₂-), 1.75-1.69 (m, 2H, -CH₂-), 1.53-1.41 (m, 6H, -CH₂-), 1.41-1.20 (m, 24H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₃₈H₅₈O₄, 578.43; found 578.620.

6-((4'-(tetradecyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC14): Yield: 72%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.94 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 1.96 (s, 3H, -CH₃), 1.86-1.76 (m, 4H, -CH₂-), 1.75-1.70 (m, 2H, -CH₂-), 1.56-1.41 (m, 6H, -CH₂-), 1.41-1.20 (m, 20H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₃₆H₅₄O₄, 550.81; found 550.546.

6-((4'-(dodecyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC12): Yield: 74%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.94 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 1.97 (s, 3H, -CH₃), 1.89-1.76 (m, 4H, -CH₂-), 1.75-1.69 (m, 2H, -CH₂-), 1.57-1.41 (m, 6H, -CH₂-), 1.41-1.19 (m, 16H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₃₄H₅₀O₄, 522.76; found 522.507.

6-((4'-(decyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC10): Yield: 71%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.92 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 1.97 (s, 3H, -CH₃), 1.89-1.76 (m, 4H, -CH₂-), 1.75-1.69 (m, 2H, -CH₂-), 1.57-1.41 (m, 6H, -CH₂-), 1.41-1.20 (m, 12H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₃₂H₄₆O₄, 494.71; found 494.478.

6-((4'-(octyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC8): Yield: 76%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.92 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 1.99 (s, 3H, -CH₃), 1.89-1.76 (m, 4H, -CH₂-), 1.75-1.69 (m, 2H, -CH₂-), 1.57-1.41 (m, 6H, -CH₂-), 1.41-1.22 (m, 8H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₃₀H₄₂O₄, 466.65; found 466.378.

6-((4'-(hexyloxy)-[1,1'-biphenyl]-4-yl)oxy)hexyl

methacrylate (M6biC6): Yield: 75%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.92 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 2.01 (s, 3H, -CH₃), 1.89-1.76 (m, 4H, -CH₂-), 1.75-1.69 (m, 2H, -CH₂-), 1.59-1.20 (m, 10H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₂₈H₃₈O₄, 438.60; found 438.586.

6-((4'-butoxy-[1,1'-biphenyl]-4-yl)oxy)hexyl methacrylate (M6biC4): Yield: 70%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.92 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 4H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 2.01 (s, 3H, -CH₃), 1.89-1.76 (m, 4H, -CH₂-), 1.75-1.69 (m, 2H, -CH₂-), 1.60-1.26 (m, 6H, -CH₂-), 0.88 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₂₆H₃₄O₄, 410.55; found 410.414.

6-((4'-ethoxy-[1,1'-biphenyl]-4-yl)oxy)hexyl methacrylate (M6biC2): Yield: 78%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.92 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16-3.96 (m, 6H, -OCH₂-), 2.01 (s, 3H, -CH₃), 1.82 (m, 2H, -CH₂-), 1.72 (m, 2H, -CH₂-), 1.56-1.42 (m, 4H, -CH₂-), 1.34 (t, 3H, -CH₃). Mass Spectrometry (MS) (m/z) [M] Calcd for C₂₄H₃₀O₄, 382.49; found 382.315.

6-((4'-methoxy-[1,1'-biphenyl]-4-yl)oxy)hexyl methacrylate (M6biC1): Yield: 82%. ¹H NMR (δ, ppm, CDCl₃): 7.46 (d, 4H, Ar-H), 6.92 (d, 4H, Ar-H), 6.10 (d, 1H, =CH₂), 5.55 (d, 1H, =CH₂), 4.16 (m, 2H, -OCH₂-), 3.99 (m, 2H, -OCH₂-), 3.85 (t, 3H, -CH₃), 2.01 (s, 3H, -CH₃), 1.81 (m, 2H, -CH₂-), 1.72 (m, 2H, -CH₂-), 1.57-1.41 (m, 4H, -CH₂-). Mass Spectrometry (MS) (m/z) [M] Calcd for C₂₃H₂₈O₄, 368.47; found 368.329.