Supporting information:

Synthesis of K-19. 4,4'-Bis(*p*-hexyloxystyryl)-2,2'-bipyridine¹ (200 mg, 0.36 mmol) and dichloro(*p*-cymene)ruthenium(II) dimer (109 mg, 0.18 mmol) in DMF were heated at 60 °C for 4 h under argon in the dark. Subsequently, 4,4'-dicarboxylic acid-2,2'-bipyridine (88 mg, 0.36 mmol) was added and the reaction mixture was heated to 140 °C for another 4 h. To the resulting dark green solution was added solid NH₄NCS (411 mg, 5.4 mmol) and the reaction mixture was further heated for 4 h at 140 °C. DMF was removed on a rotary evaporator under vacuum and water (200 ml) was added to get the precipitate. The purple solid was filtered off, washed with water and Et₂O, and dried under vacuum. The crude compound was dissolved in basic methanol (with TBAOH) and further purified on the Sephadex LH-20 with methanol as eluent. The main band was collected, concentrated, and precipitated with acidic methanol (HNO₃) to obtain pure K-19. ¹H NMR ($\delta_{\rm H}$ /ppm in CD₃OD/NaOD): 9.4 (d, 1H), 9.2 (d, 1H), 8.9 (s, 1H), 8.8 (s, 1H), 8.3 (s, 1H), 8.15 (s, 1H), 8.0 (d, 1H), 7.80 (d, 1H), 7.7 ~6.9 (m, 16H), 4.1~0.8 (44H). Analytical calculation for RuC₅₂H_{51.5}N₆O₆S₂·2H₂O·0.5(TBA): C, 61.1; H, 6.3; N, 7.7%. Found: C, 60.8; H, 6.2; N, 7.8%.

References:

(1) Klein, C.; Grätzel, M. Org. Lett. 2004, in preparation.



Figure S1. Molecular structures of (a) Z-907 and (b) N-719



Figure S2. Square-wave voltammograms of a Pt ultramicroelectrode in DMF solution containing the K-19 dye. Supporting electrolyte: 0.1 M 1-ethyl-3-methylimidazolium bis(trifluoromethanesulfonyl)amide.



Figure S3. Electronic absorption and emission spectra of the K-19 dye in acetonitrile and *tert*-butyl alcohol (volume ratio: 1:1).



Figure S4. Absorption spectra of K-19 and the Z-907 anchored on an 8 μ m thickness transparent nanocrystalline TiO₂ film.



Figure S5. ATR-FTIR spectrum for 4 μ m thick mesoporous TiO₂ film coated with the K-19 dye. The back ground spectrum of a TiO₂ reference film heated to 500 °C to remove surface-adsorbed water has been subtracted for clarity of presentation.



Figure S6 Temporal evolution of photovoltaic device parameters of K-19 sensitizer based solar cells during continued thermal aging at 80 °C in the dark.



Figure S7. Temporal evolution of photovoltaic device parameters of K-19 sensitizer based solar cells during continued thermal aging at 80 °C in the dark. 1-decylphosphonic acid was used as co-adsorbent in the dye solution at a molar fraction of 20%.



Figure S8 Temporal evolution of photovoltaic device parameters of K-19 sensitizer based solar cells during continued one sun visible-light soaking at 60 °C.