ROYAL SOCIETY OF CHEMISTRY

Supporting Information

An aqueous electrolyte with up to 2.9 V operating voltage

EXPERIMENTTAL

Materials

Tween 20 (poly(ethyleneglycol) (20) sorbitan monolaurate) and 2-Propanol (99.5%, AR) were purchased from Sigma-Aldrich, St. Louis, MO, Cyclohexane (99.5%, AR) and Potassium chloride (KCl, 99.5%, AR) were obtained from Aladdin Bio-Chem Technology Co. Ltd), Graphic sheet (thickness: 1 mm) was purchased from Kunshan Shangte New Material Co., Ltd.

Method

90.3 wt% 0.1 M KCl solution, 1 wt% Cyclohexane, 7.18 wt% Tween 20 and 1.52 wt% 2-Propanol were mixed in a conical flash and sonicated for 20 min, then stood for 24 h to obtain the microemulsion electrolyte. 1.5×1.5 cm Graphic sheets were used as the working electrode and counter electrode.

Characterization

Conductivity of solutions was measured with Radiometer CDM 83 conductivity meter. Cyclic voltammetry (CV) experiments, Galvano static charge-discharge (GCD), were carried out using electrochemical measurement unit (Solarton S1 1280B) with two electrodes system. EIS experiments were performed on Autolab (Autolab PGSTAT302N,) from 0.01 Hz to 1000 KHz. Fourier transform infrared spectrum (FT-IR, Bruker Tensor 27, Bruker Daltonics, Germany, KBr tablet method) at 532 nm were employed to characterize the chemical structure. Capacitance values were calculated by the equation $C = It/\Delta V$, where C is the Capacitance, I is the discharge current, t is the discharge time in seconds and ΔV is the change in potential (after taking the IR drop into account).

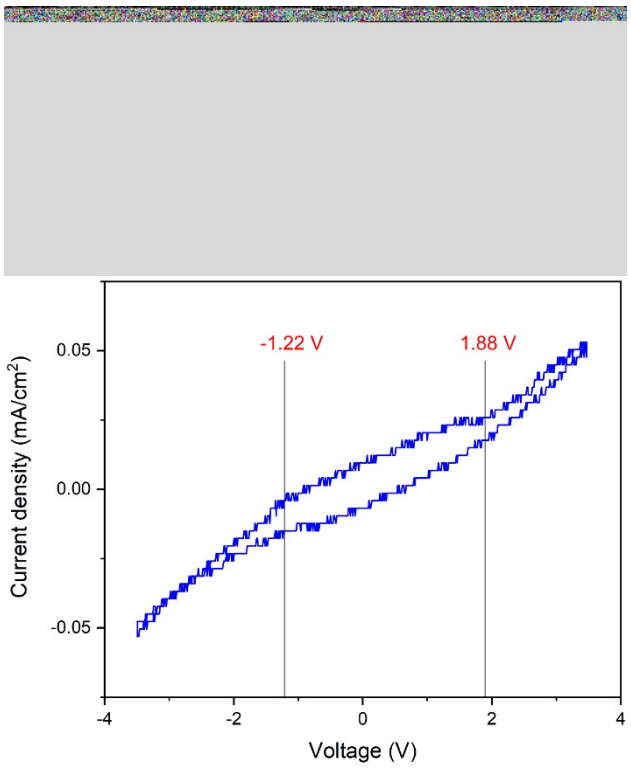

Fig. S1 The CV of surfactant/cosurfactant containing 82.5 wt% Tween 20 and 17.5 wt% 2-Propanol at 100 mV/s.

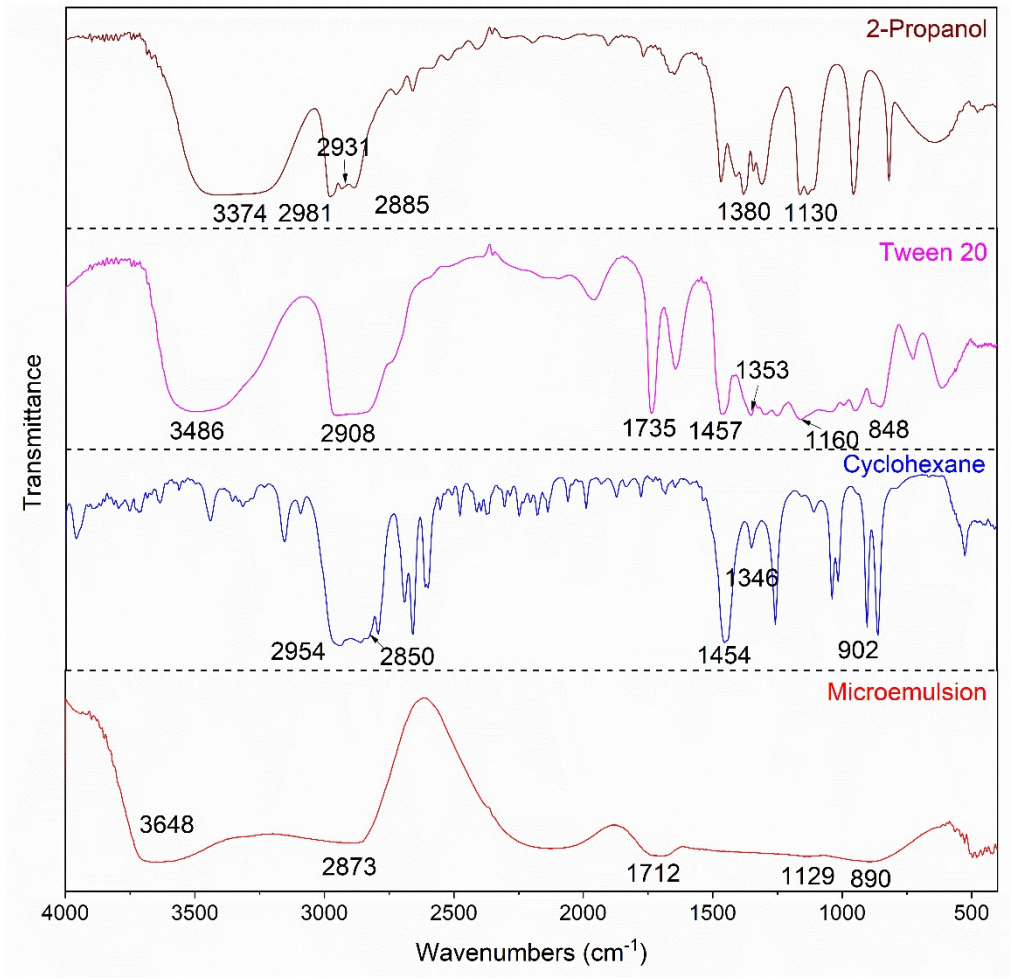

Fig. S2 The FT-IR data of a) 2-propanol, b) Tween 20, c) cyclohexane and d) microemulsion

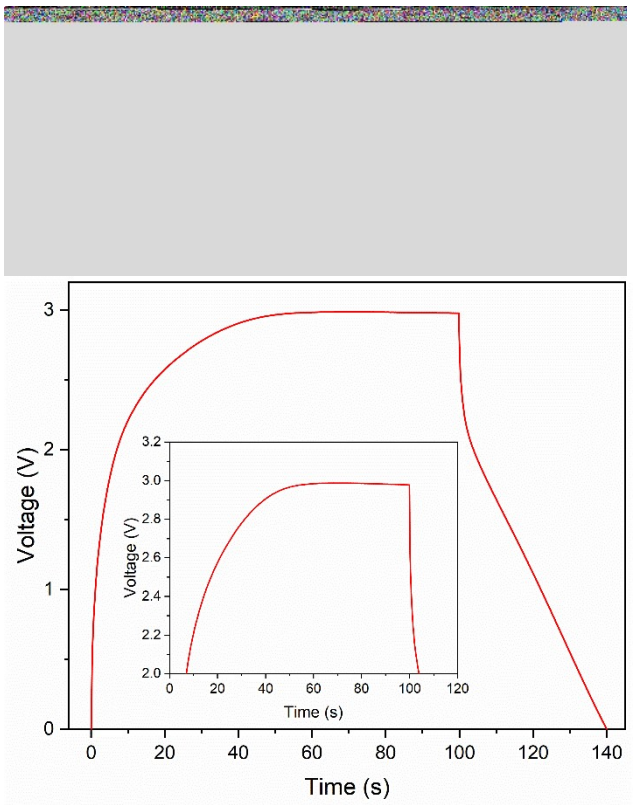

Fig. S3 Galvanostatic charge-discharge curve of microemulsion electrolyte at 1 mA/cm^2.