Supporting Information

Deep Eutectic Solvents as suitable electrolytes for Electrochromic Devices.

Hugo Cruz*, Noémi Jordão, Patrícia Amorim, Madalena Dionísio and Luís C. Branco*.

E-mail: hg.cruz@fct.unl.pt; l.branco@fct.unl.pt Fax: +351 212948550; Tel.: +351 212948300

LAQV, REQUIMTE, Departamento de Química, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516 Monte de Caparica, Portugal.

Table of content

1. Cyclic Voltammetry in a 3-electrode configuration

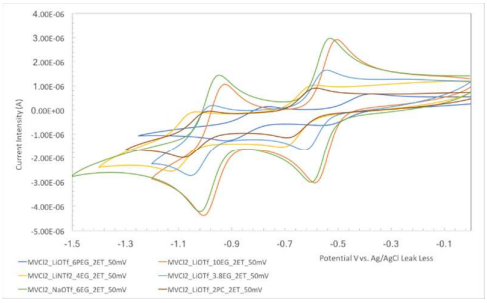

Figure S1. Overlap of the I-E response for both electron transfer for the MVCl2 (15mM) in DES as electrolyte.

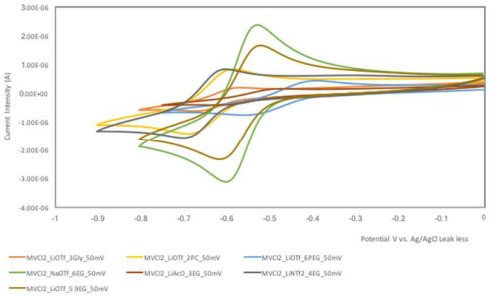

Figure S2: Overlap of the I-E response for 1st electron transfer for the $MVCl_2$ (15mM) in DES as electrolyte.

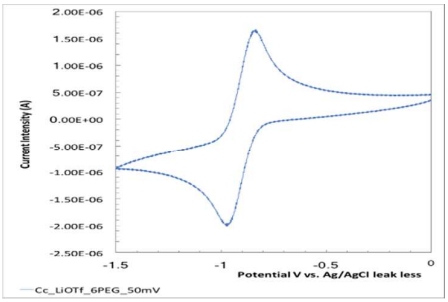

Figure S3: I-E response for 1st electron transfer for the Cc (15mM) in DES LiOTf:6PEG as electrolyte.

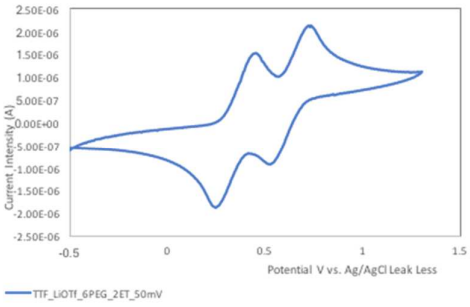

Figure S4: I-E response for 1st and 2nd electron transfer for the TTF (15mM) in DES LiOTf:6PEG as electrolyte.

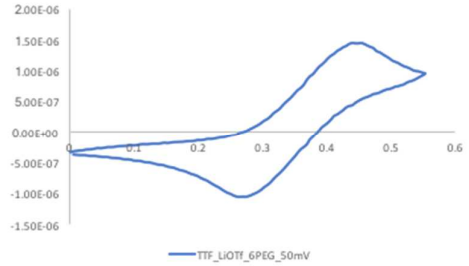

Figure S5: I-E response for 1st electron transfer for the TTF (15mM) in DES LiOTf:6PEG as electrolyte.

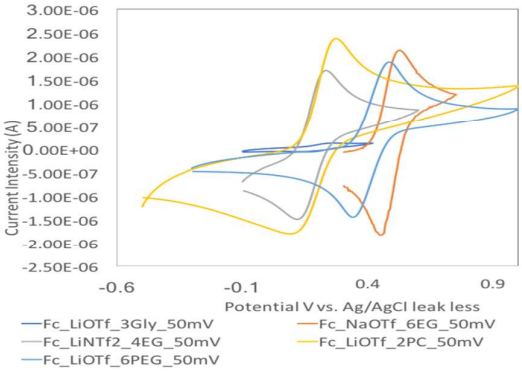

Figure S6: Overlap of the I-E response for the electron transfer of Fc (15mM) in DES as electrolyte.

2. Cyclic Voltammetry in a 2-electrode configuration cell

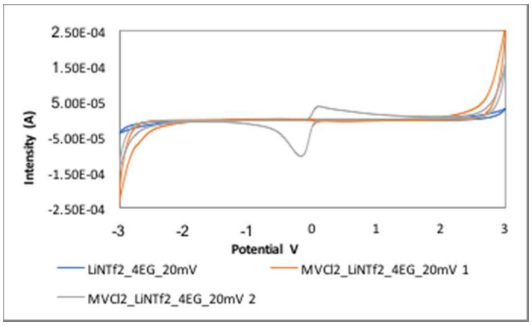

Figure S7: I-E response for the CV overlapping of electrolyte $LiNTf_2$:4EG (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

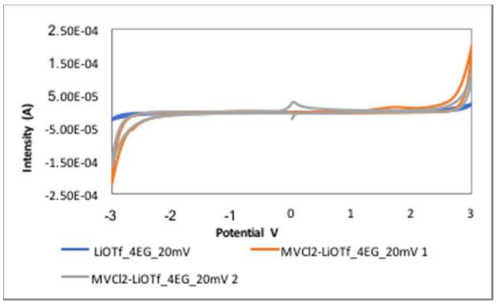

Figure S8: I-E response for the CV overlapping of electrolyte LiOTf:4EG (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

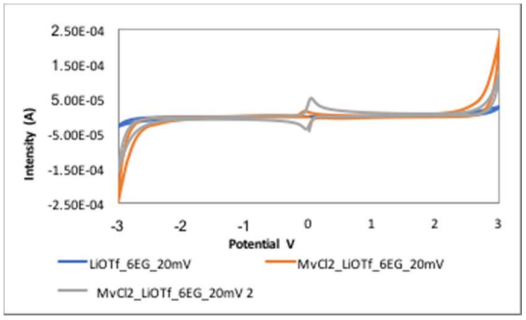

Figure S9: I-E response for the CV overlapping of electrolyte LiOTf:6EG (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

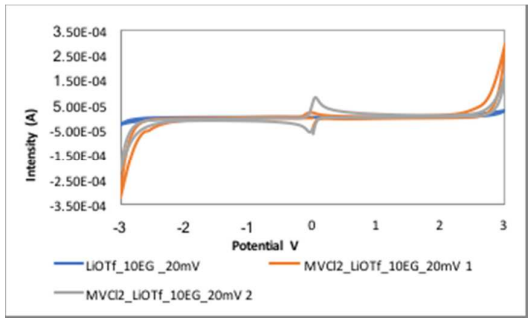

Figure S10: I-E response for the CV overlapping of electrolyte LiOTf:10EG (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

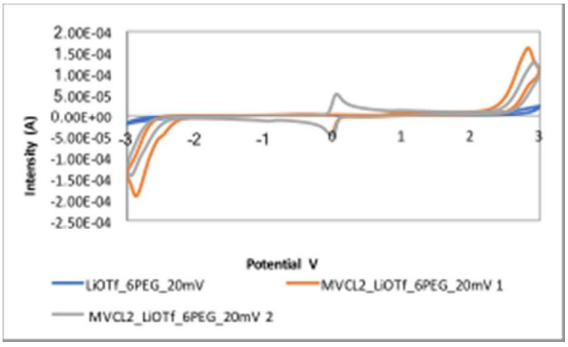

Figure S11: I-E response for the CV overlapping of electrolyte LiOTf:6PEG (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

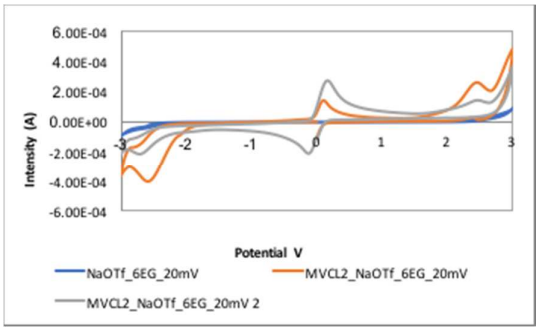

Figure S12: I-E response for the CV overlapping of electrolyte NaOTf:6EG (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

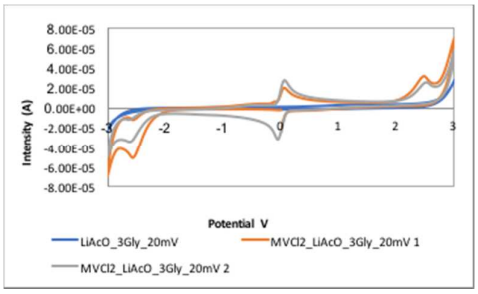

Figure S13: I-E response for the CV overlapping of electrolyte LiAcO:3Gly (blue) and the $MVCl_2$, 15mM in the same electrolyte (1st cycle in orange and 2nd cycle in gray) in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

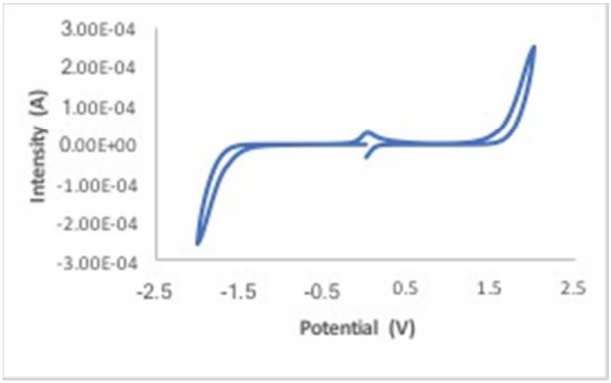

Figure S14: I-E response for the CV overlapping of 1st cycle in blue for electrolyte NaOTf:6EG and the $(C_5O_2)_2bpyI_2$, 15mM in electrochemical window (0/-2/2/0) at a scan rate of 20 mV/s.

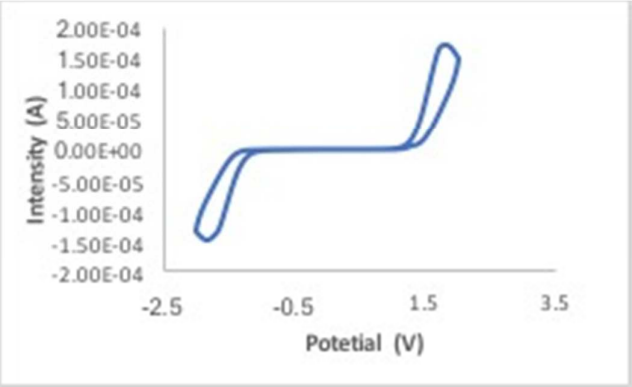

Figure S15: I-E response for the CV of 1st cycle in blue for electrolyte LiOTf:6PEG and the $(C_5O_2)_2bpyI_2$, 15mM in electrochemical window (0/-2/2/0) at a scan rate of 20 mV/s.

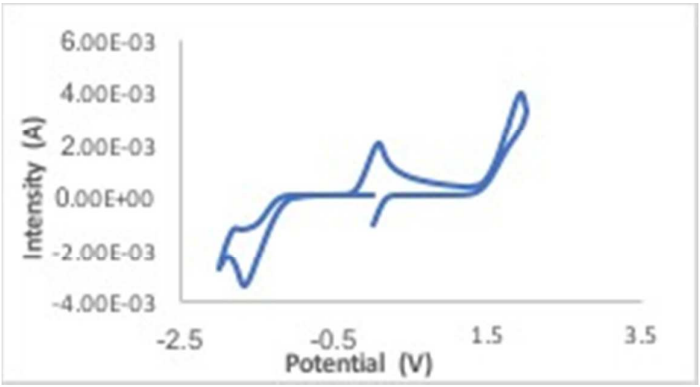

Figure S16: I-E response for the CV of 1st cycle in blue for electrolyte LiOTf:10EG and the $(C_5O_2)_2bpyI_2$, 15mM in electrochemical window (0/-2/2/0) at a scan rate of 20 mV/s.

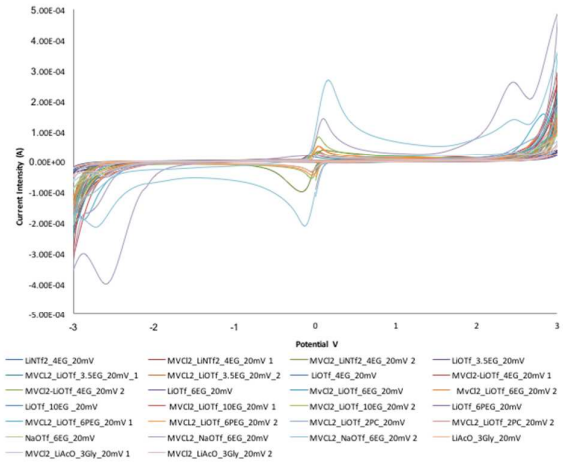

Figure S17: overlap of all the I-E response for the CV all electrolytes MVCl2 15mM in electrochemical window (0/-3/3/0) at a scan rate of 20 mV/s.

3. RGB coordinates

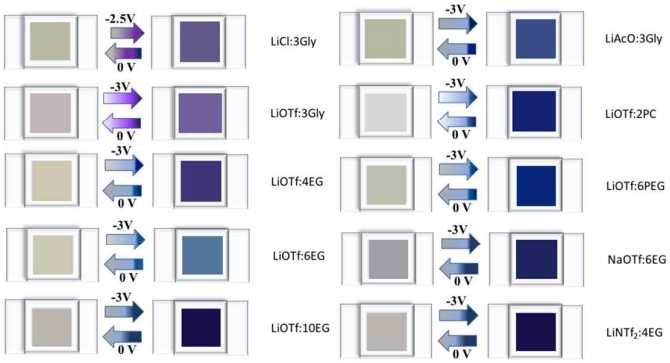

Figure S18: Coloration gradient for the DESs studied with $MVCl_2$.

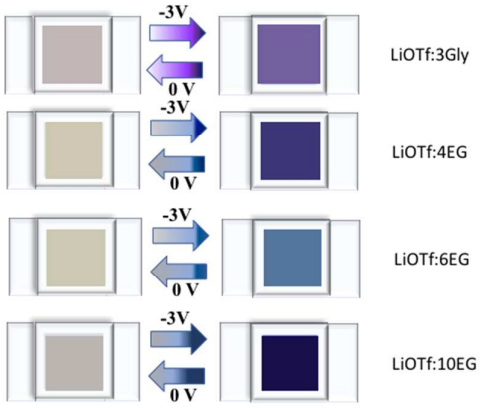

Figure S18b: Coloration gradient for the DESs studied with $MVCl_2$.

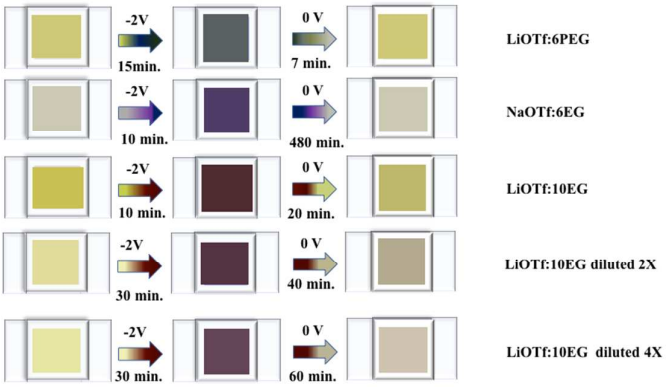

Figure S19: Coloration gradient for the DESs studied with $[(C_5O_2)_2bpy]I_2$.

4. DSC/DRS measurements

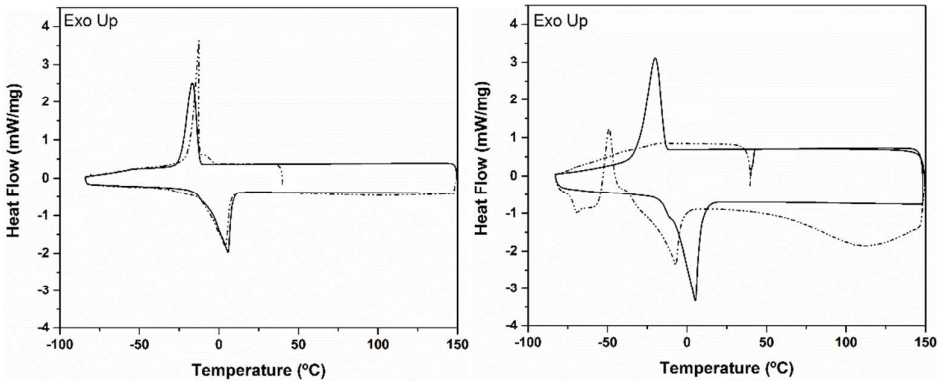

Figure S20: (a) Heat flow thermogram for PEG400 at 10ºC min $^{-1}$ (1st cycle - dash dot; 2nd cycle – full line). (b) Heat flow thermogram for PEG400 at 20ºC min $^{-1}$ (1st cycle - dash dot; 2nd cycle – full line).

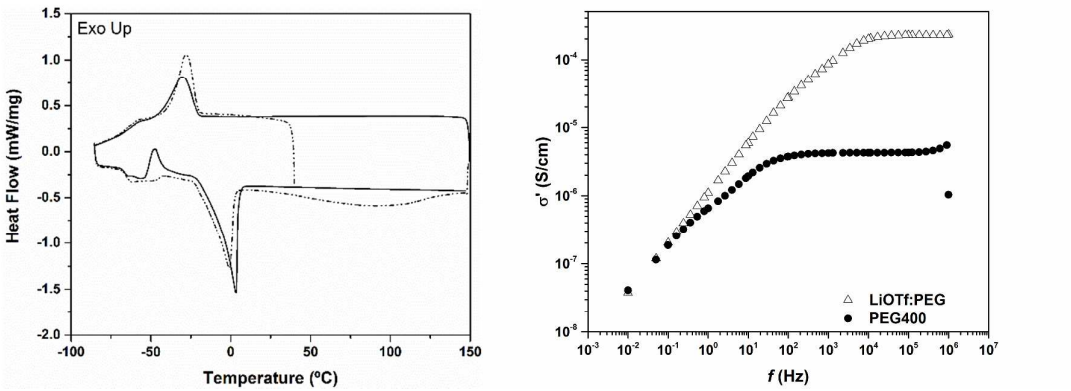

Figure S21: (a) Heat flow thermogram for LiOTf:6PEG at 10ºC min $^{-1}$ (1st cycle - dash dot; 2nd cycle – full line). (b) Real part of complex conductivity for LiOTf:6PEG and PEG400.

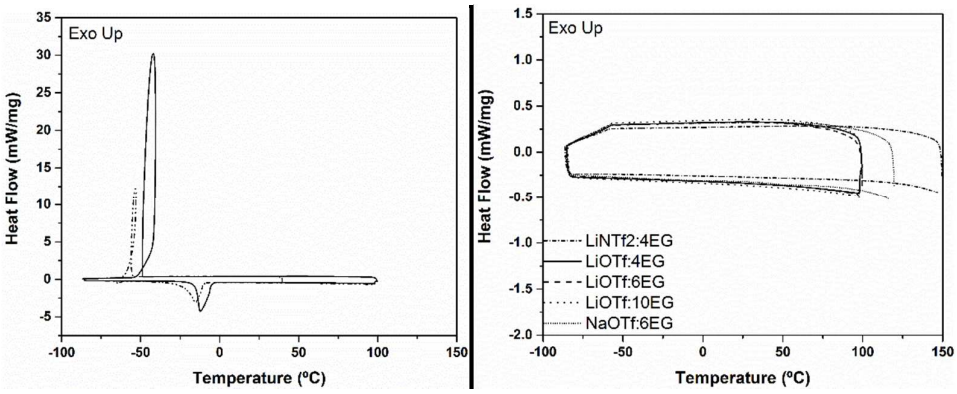

Figure S22: (a) Heat flow thermogram for EG at 10ºC min $^{-1}$ (1st cycle - dash dot; 2nd cycle – full line). (b) Heat flow thermogram for $LiNTf_2$:4EG, LiOTf:4EG, LiOTf:6EG, LiOTf:10EG at 10ºC min $^{-1}$ after a thermal treatment up to 100ºC (except in NaOTf:6EG up to 120ºC and $LiNTf_2$:4EG up to 150ºC).

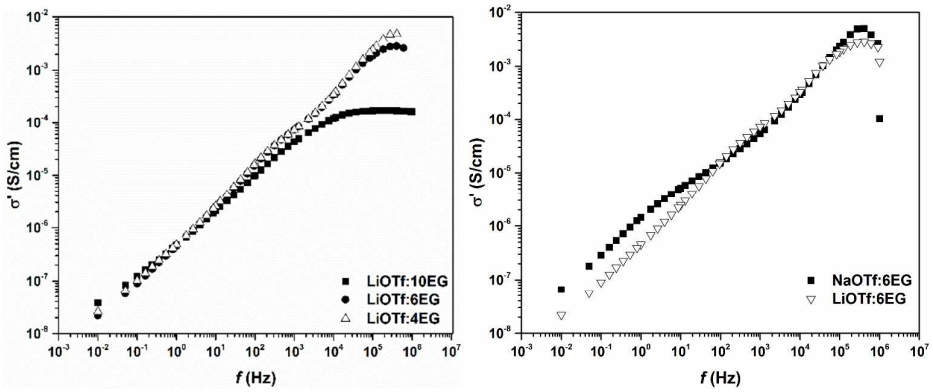

Figure S23: (a) Real part of complex conductivity for LiOTf:4EG, LiOTf:6EG, LiOTf:10EG and (b) for NaOTf:6EG and LiOTf:6EG.