Supplementary Information

Organic Thermoelectric Films: Achieving High Conductivity and Power Factor Through Sulfonated-Poly(3,4-ethylenedioxythiophene) and Single-Walled Carbon Nanotube Composites.

Maël Idir †, Guillaume Chamelot †, Yinghui He,[⊥] Thomas Lemieux †, Kendra Bueley, [⊥]Serge Beaupré †, Salima Alem, [⊥] Jianping Lu, [⊥] Jean-François Morin †, Mario Leclerc *†

AUTHOR ADDRESS

†Département de Chimie and Centre de recherche sur les matériaux avancés (CERMA), Université Laval, Québec City, Québec G1V 0A6, Canada

[⊥] Quantum and Nanotechnologies Research Centre, National Research Council Canada, Ottawa, Ontario, K1A0R6, Canada

UV-Vis analysis and fluorescence

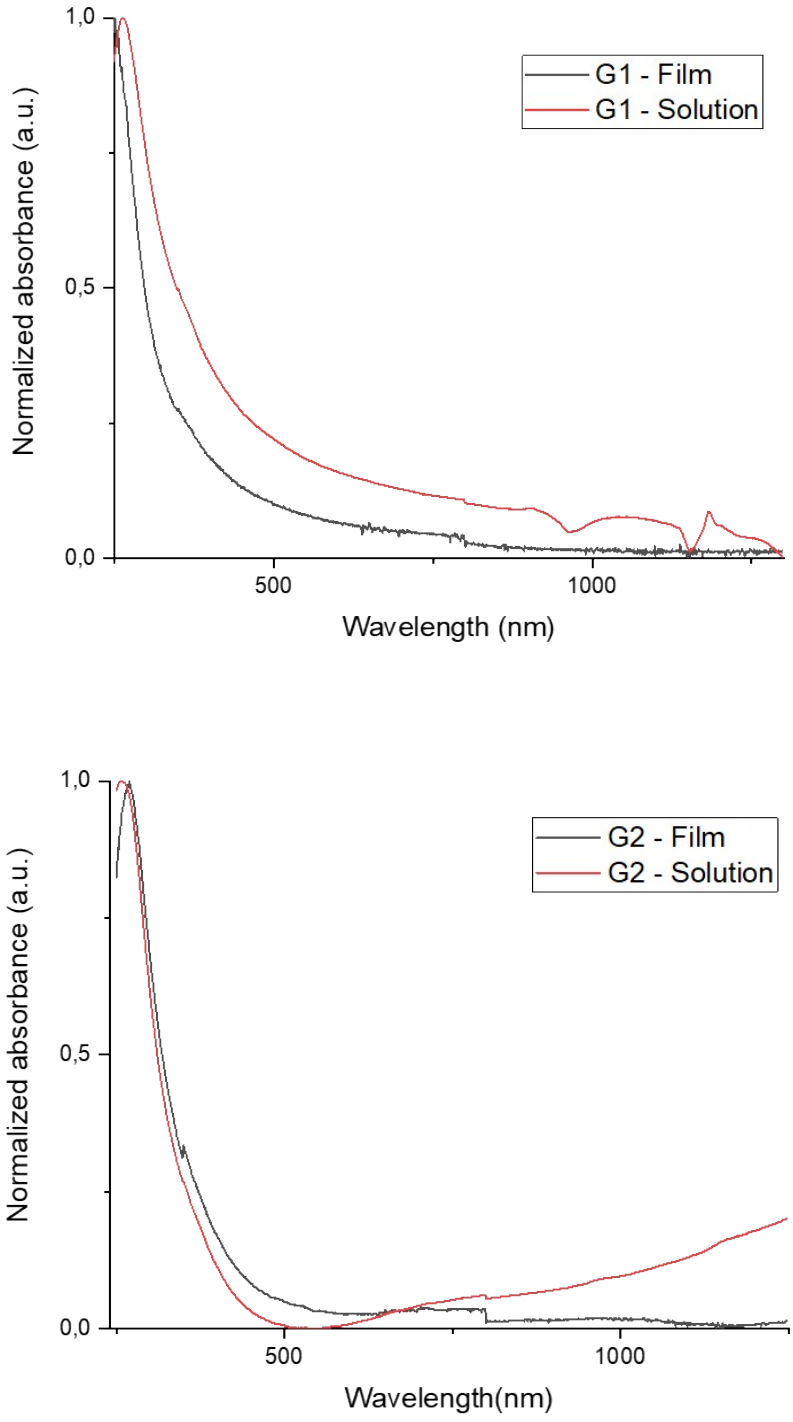
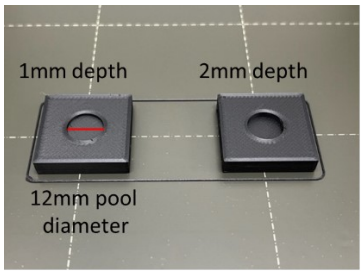


Figure S1: UV-Vis Spectra of the G1 and G2 composite both in film and solution

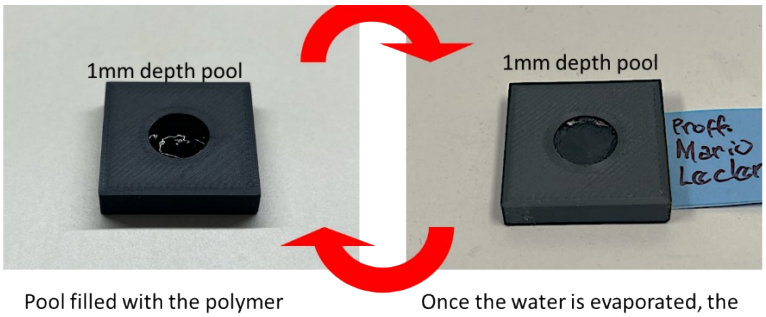
No fluorescence spectra have been recorded due to the fact that the sample were not active in fluorescence.

Thermal conductivity

The obtained pellet presents a rough surface, which may affect the LFA test. The LFA test was perform 16 times on the carbon-based sample. The quality of the fit was 90% or higher and the average thermal diffusivity value was found to be 0.0025 cm2 s-1. It was only possible to obtain the average thermal diffusivity value of the carbon-based sample. This is because the quantity of carbon-based sample was only enough to produce 1mm thick pellet. This limitation does not allow direct comparison with the graphite reference sample which is 2mm thick. In order to obtain the Cp value, 2mm thick pellets are required.

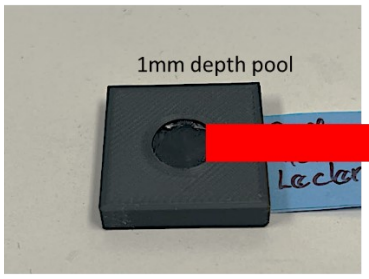


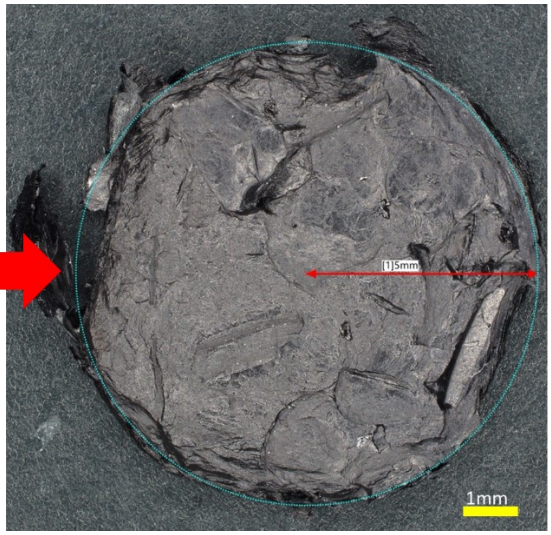
3D printed pools



Pool filled with the polymer dispersed in water. The evaporation of the water is done at 40 C

Once the water is evaporated, the polymer precipitates a thin layer at the bottom. The pool is filled again. This process is repeated until reach a 1mm thickness.





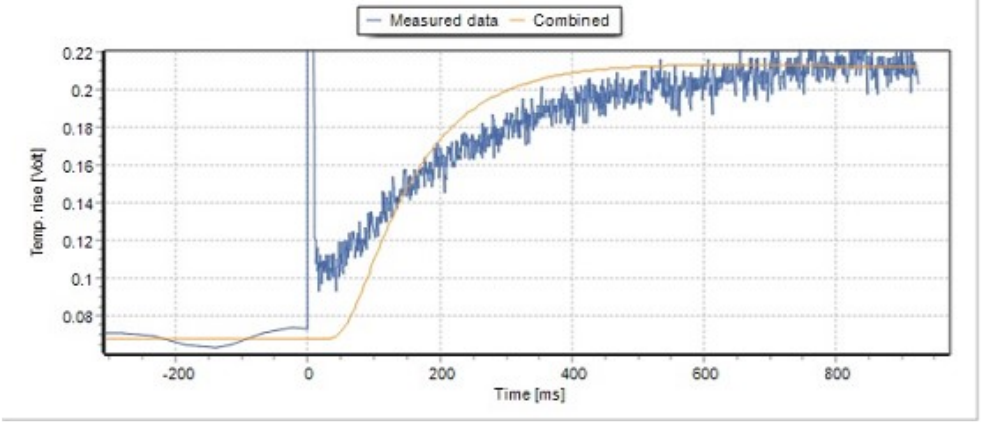
Pellet obtained after repeated evaporation and refiling of the 3D printed pools with the carbon-based polymer.

Figure S2: Pellet preparation protocol for thermal conductivity measurement

Linseis Xenon Laser Flash Linseis-AproSoft v4.01 C.034 5/3/2024

Linseis Laboratorium

Project	2024-04-29	Temp in °C	31.4
Material	300M	Measnr	1111
Sample	4	Thickness in	0.05000
Atmosphere	Vacuum	2024-04-29_1_ETS_C-based_4_53.lf	



Details

Duration in s	0.925
Max. in V	0.21
Min. in V	0.068
Halftime in ms	128.944
Min.type	Baseline
Remark	

Pulse in ms

Length	2.000
Type	Tri
Trapez time1	0.200
Trapez time2	1.800

Condition

Operator	Alireza
Filter	0
Iris	8
Amp.	100

Thermal diffusivity

Adiabatic results in cm2/s

Ave.	0.00424
40	0.00329
50%	0.00269
60%	0.00234

Finite Pulse in cm2/s

Dusza	0.00271
Azumi	0.00271
Clark	0.00271
Combined	
Dusza	0.00245

Heatloss in cm2/s

Dusza	0.00245
Cowan	0.00245
Degiovanni	0.00269
Taylor	0
Cowan 10	0.00269

Thermal diffusivity average value= 0.0025 $cm^2\ s^{-1}$

Figure S3: Analysis report