

Conductive polymer and TPB tests at Carleton

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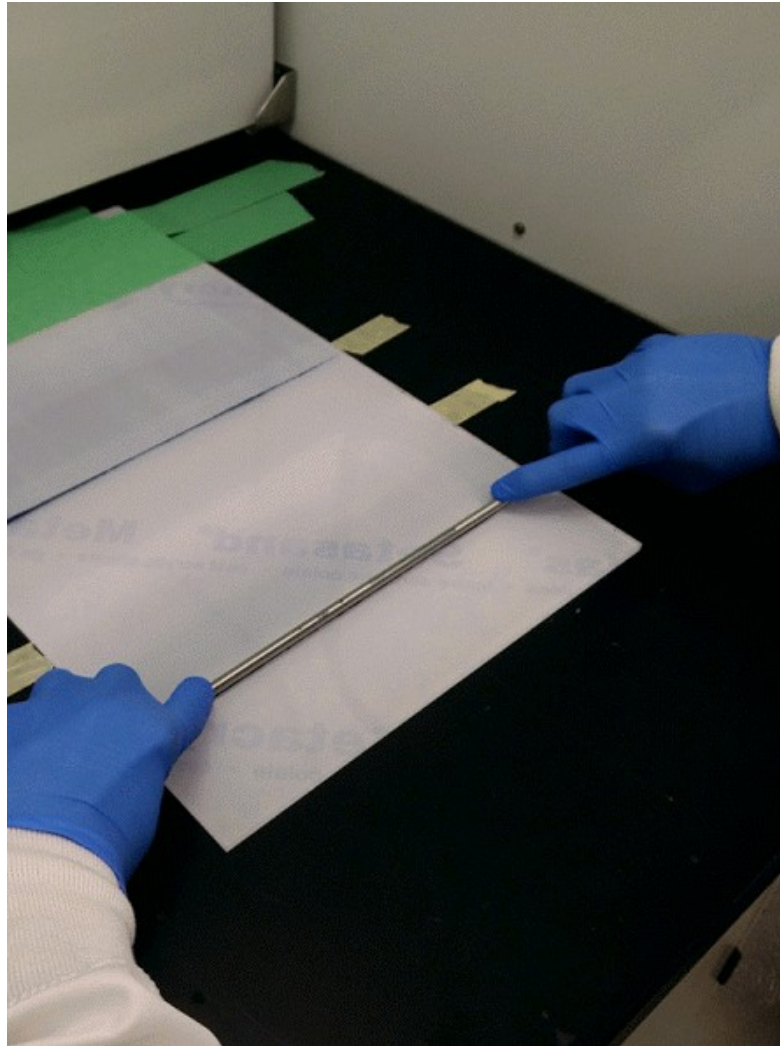
Carleton University
Ottawa, Canada



Scope

- Cryogenic stability of TPB coated Clevios coatings
 - Motivated by mixed results of tests at CERN a few months ago
 - **First results**
- Optical transparency vs. thickness
 - Planned to do next
- Optimization of the procedure
 - How thin can we make the coatings?
 - Some ideas to try

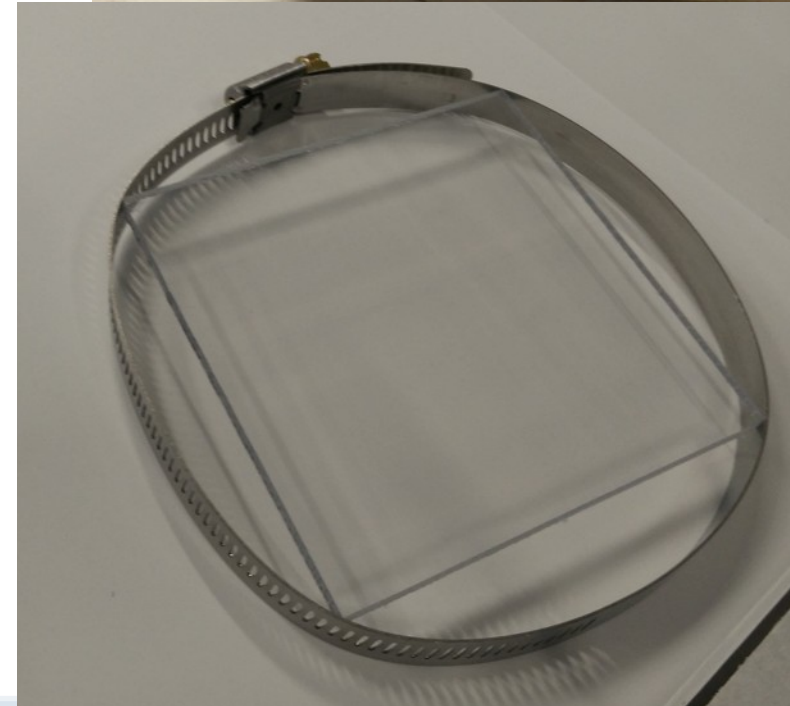
Clevios coatings production I



- Start with a large format sheet of acrylic
- Draw two 15 cm long coatings with 3 and 2-1/2 gauge wound wire rods
- This corresponds to 5 and 8 micron wet film thicknesses
- Some imperfections and irregularities visible;
- Drawing better coatings manually needs practice

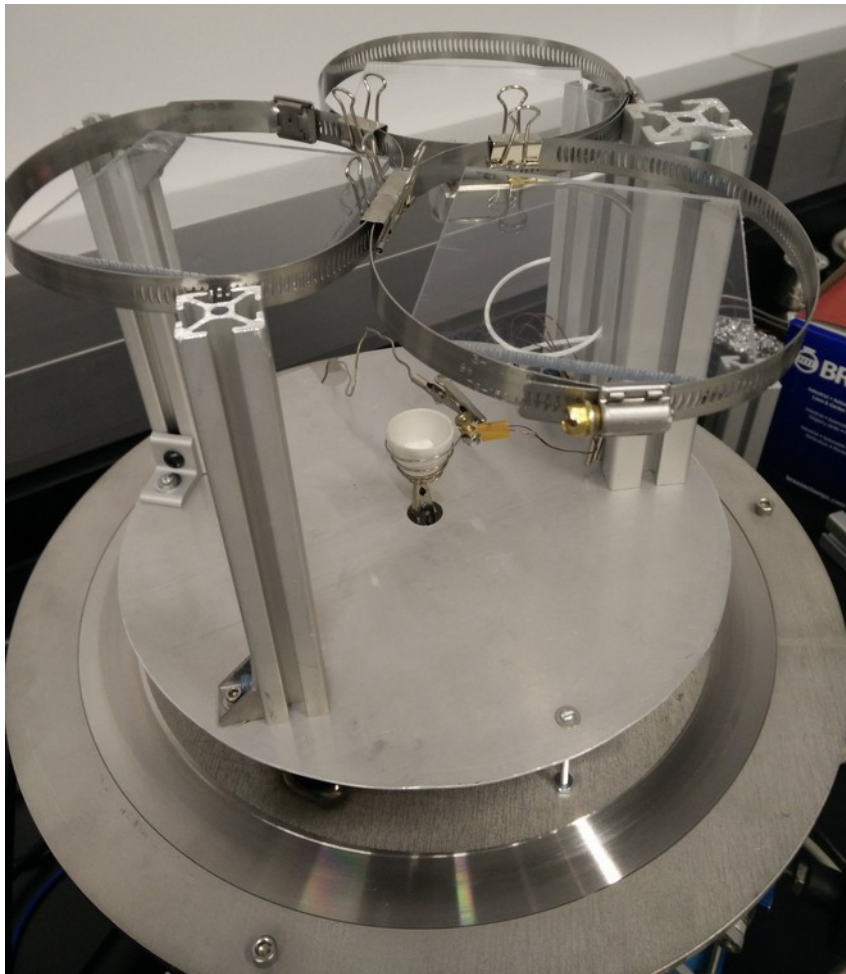
Clevios coatings production II

- Leave over the weekend in the cleanroom for drying
- Then bake at 100 C for 5 minutes in a lab oven
- Cured sheet was cut into 9 approx. 10x10 cm samples
 - 3 for each of the two coating thicknesses
 - 3 for uncoated material between coatings
- Washed with UPW and dried with compressed filtered/dry air

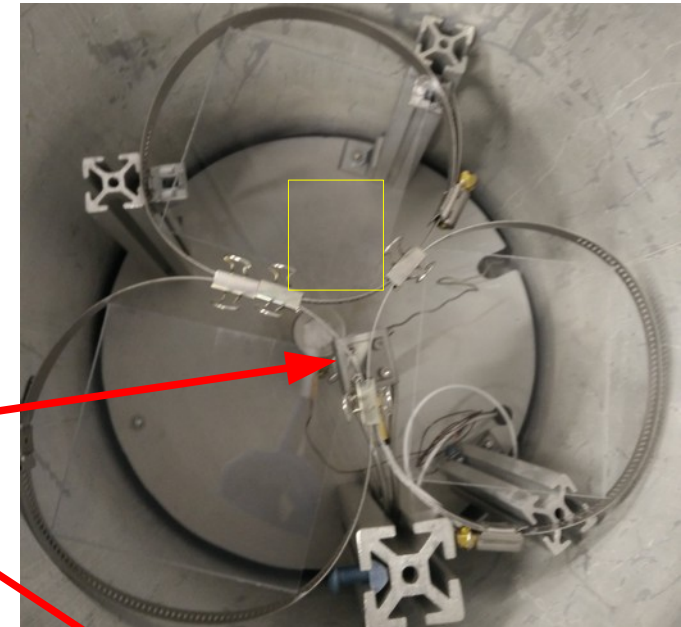


TPB deposition I

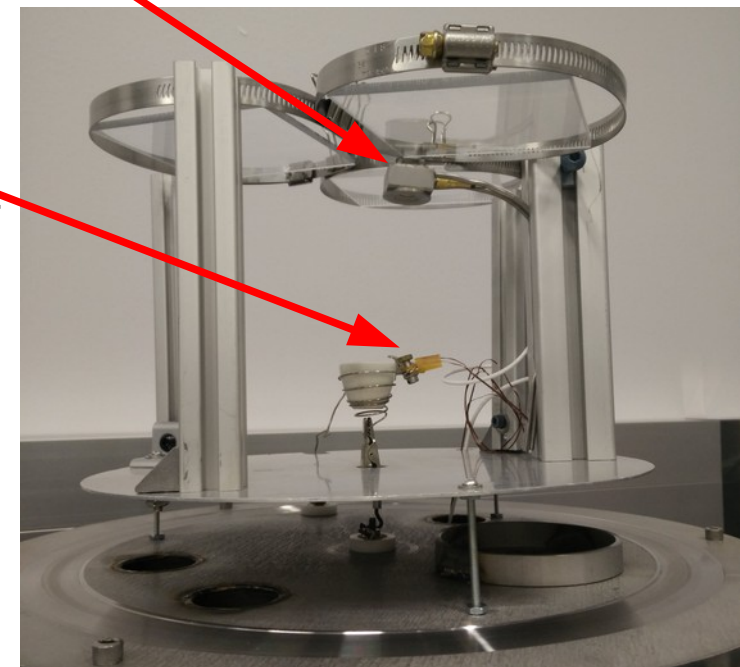
- 3 samples (uncoated, 5 micron, 8 micron) installed in the evaporator



Coating thickness monitor



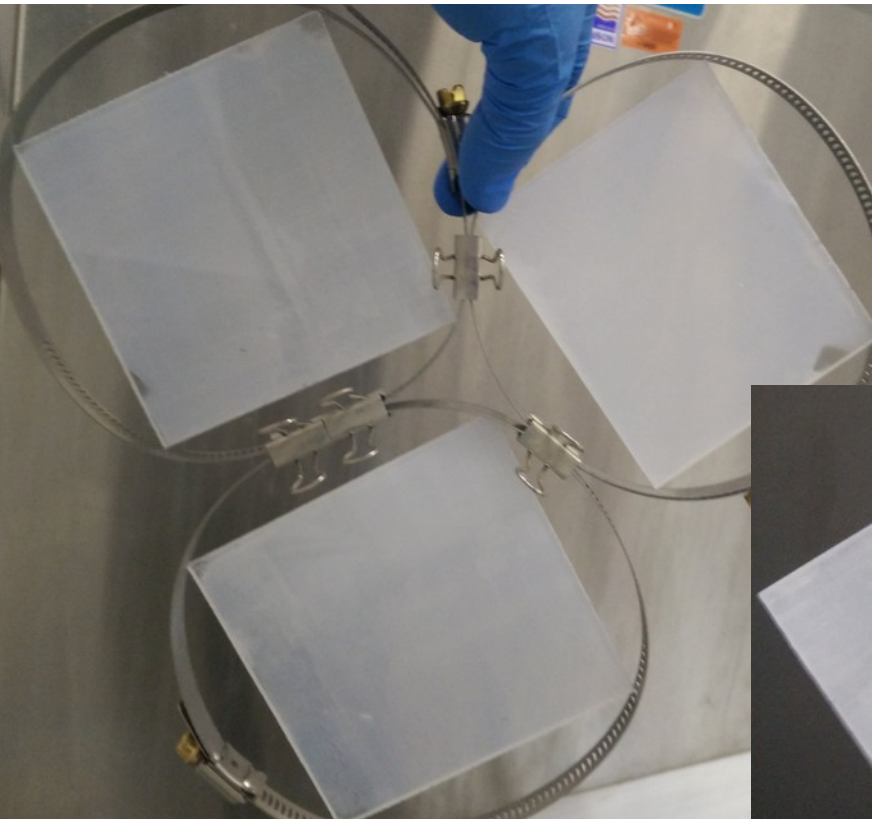
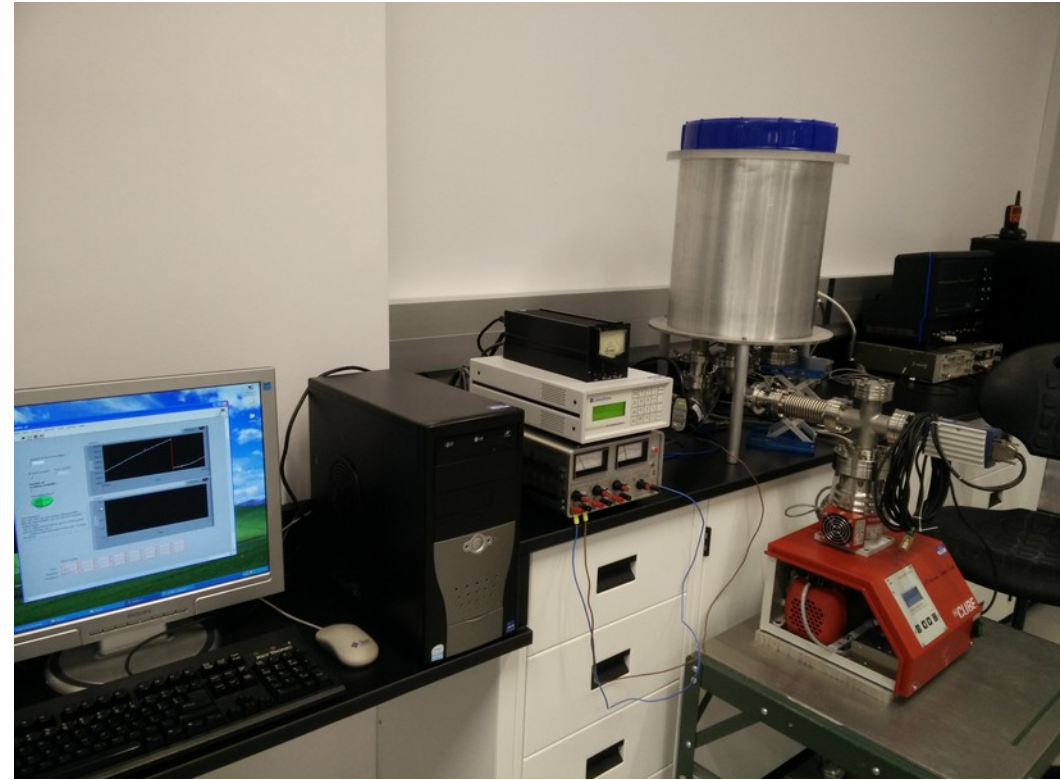
RTD thermometer



- Coating thickness is monitored in the centre.
- There is a thickness gradient between the centre and the edges of the evaporator.
- TPB thickness on samples varies smoothly changes between 3um and ~1.5-2 um in the opposite side

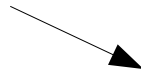
TPB deposition II

- Deposition started at $p=1.2e-4$ mbar. (Can go lower if needed)
- Deposited 3 microns of TPB over ~4h
- Deposition rate approx. 2 A/s
- Manually operated to maintain constant and low deposition rate
- All three coatings look very good!



LN2 dunk test

- Keeping moisture away the main challenge

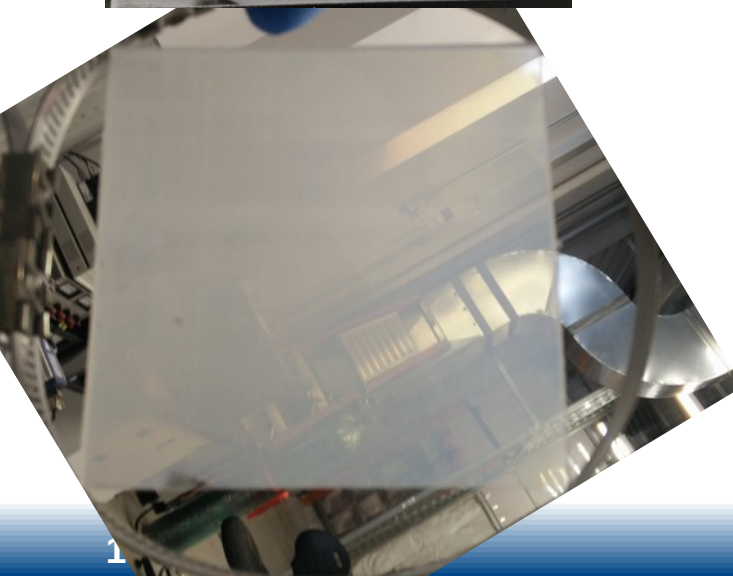
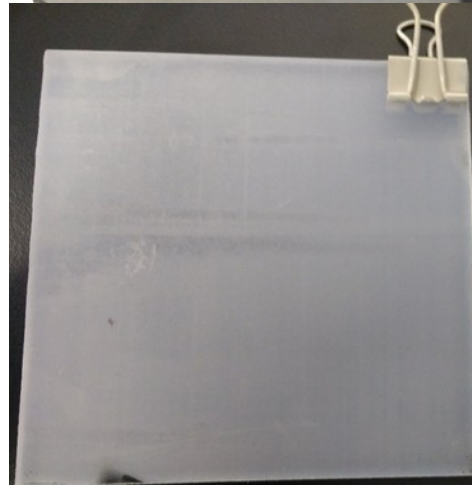


After dunk test



- Left for warm-up in a sealed bag filled with boil-off N₂
- No visible damage to the coating upon visual inspection through the plastic bag
- **Very promising**

Closer examination



after

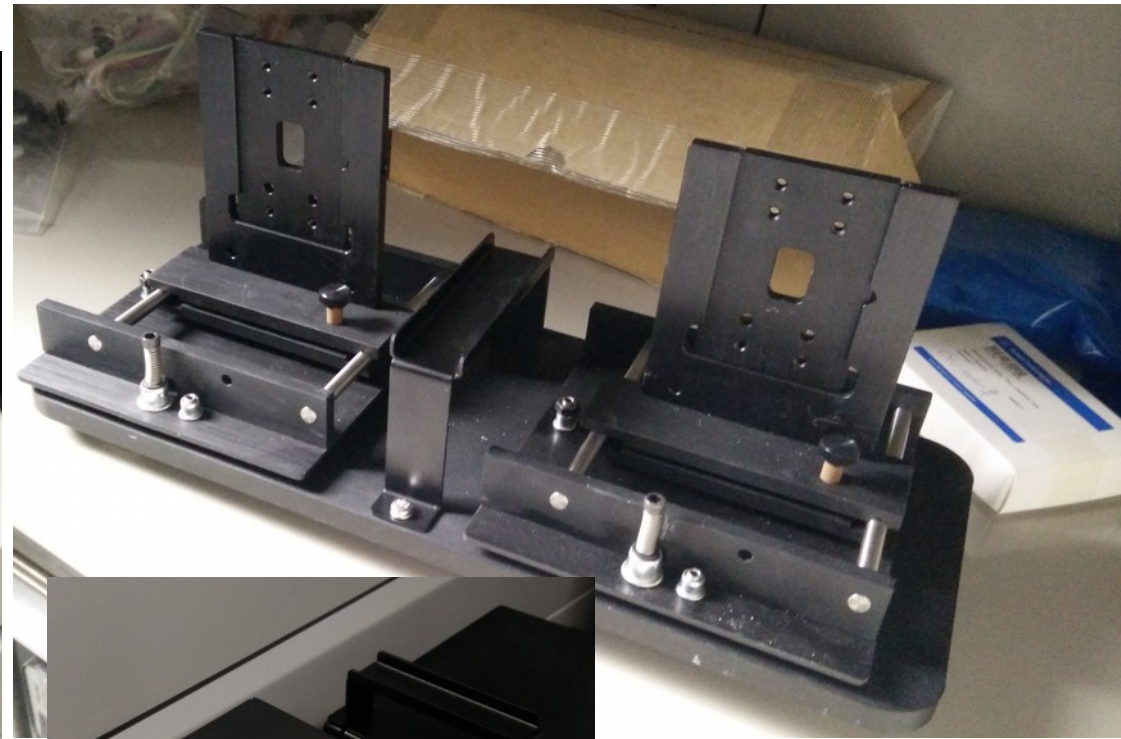


Signs of deterioration in one corner of one Clevios sample

- This is the thicker of two Clevios coatings
- This is the thicker side of the TPB coating
- This is also the edge of the sheet, where I fear Clevios could have been too diluted or pressure on the coating rod uneven
- Chance of mechanical damage through contact with neighbouring sample?

Planned transparency measurements

- Courtesy access to Agilent Cary 7000



Optional configuration with an integrating sphere