Glow Discharge Calorimetry

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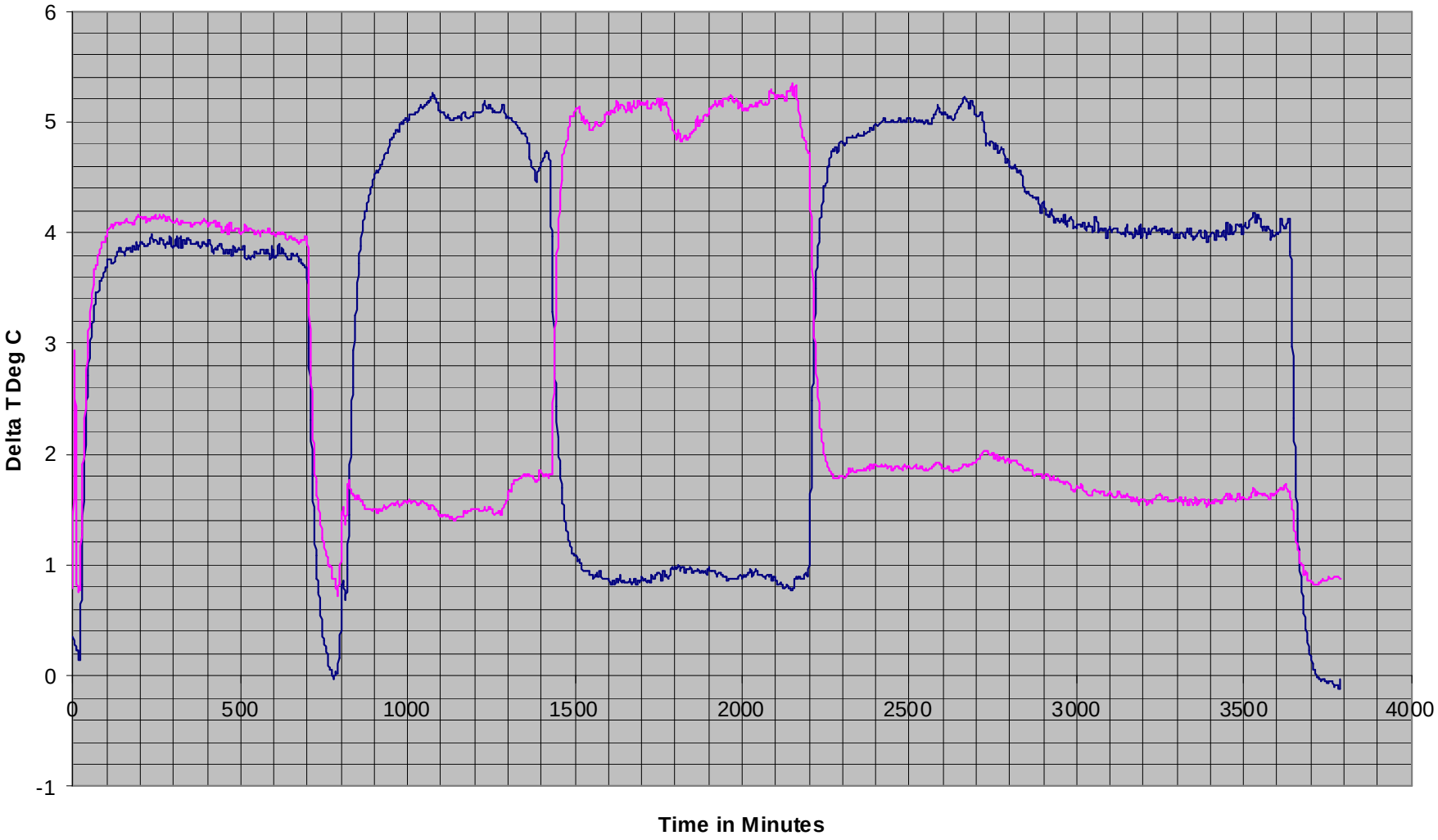
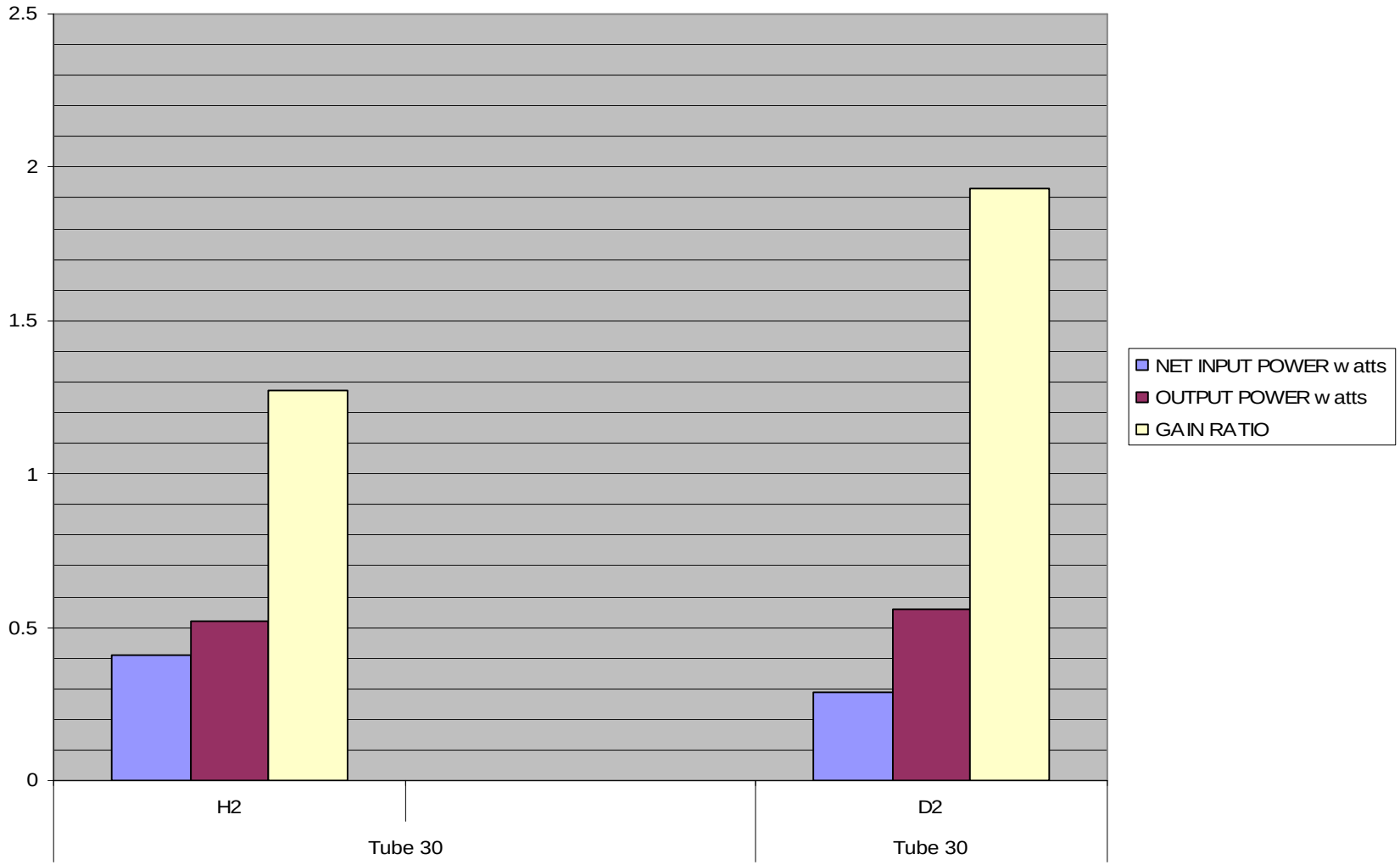
APPROACH

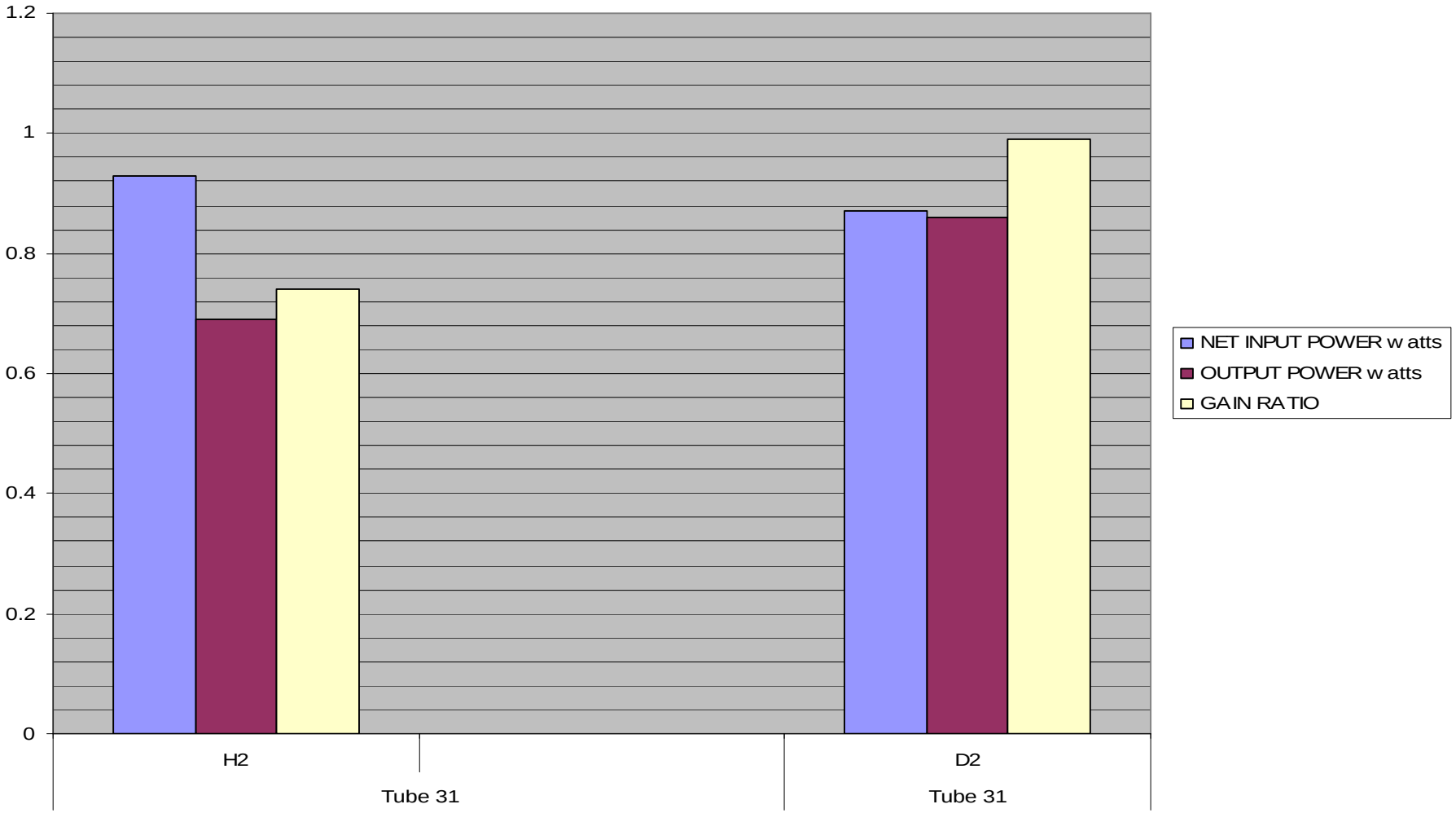
- Small Glow Discharge Tubes Operated at <1 watt Input Power on D2 and H2, The Latter for Baseline XSH
- Many Pairs of Metal Surfaces on the Electrodes
- Up to Ten Tubes Operated in Parallel at 2 to 20 Torr Using Bleed Flow from 1-Liter Ballast Tanks for Seamless Gas Changes From a Common Gas Manifold
- Thermistor Temp Monitoring Via 40-Channel Multimeter
- Resistance Heating for Calibration
- Glass or Plastic Port for Viewing Discharge and Optical Spectroscopy
- Calorimetry on Power Supplies Determines Their Waste Heat and Hence Efficiency

Tube 31 cathode (102) and anode (101) minus 107 ambient During Polarity reversals and Switch from Deuterium to Hydrogen at 2700 minutes 11-16-05




2.5
2
1.5
1
0.5
0
H2
D2
Tube 30
Tube 30
NET INPUT POWER w atts
OUTPUT POWER w atts
GAIN RATIO

Tube 31


1.2
1
0.8
0.6
0.4
0.2
0
H2
Tube 31
D2
Tube 31
NET INPUT POWER w atts
OUTPUT POWER w atts
GAIN RATIO

2nd Run of Pd Wires with Titanium Wire Anode

Confirmation Run: 200 8-mil Pd wires

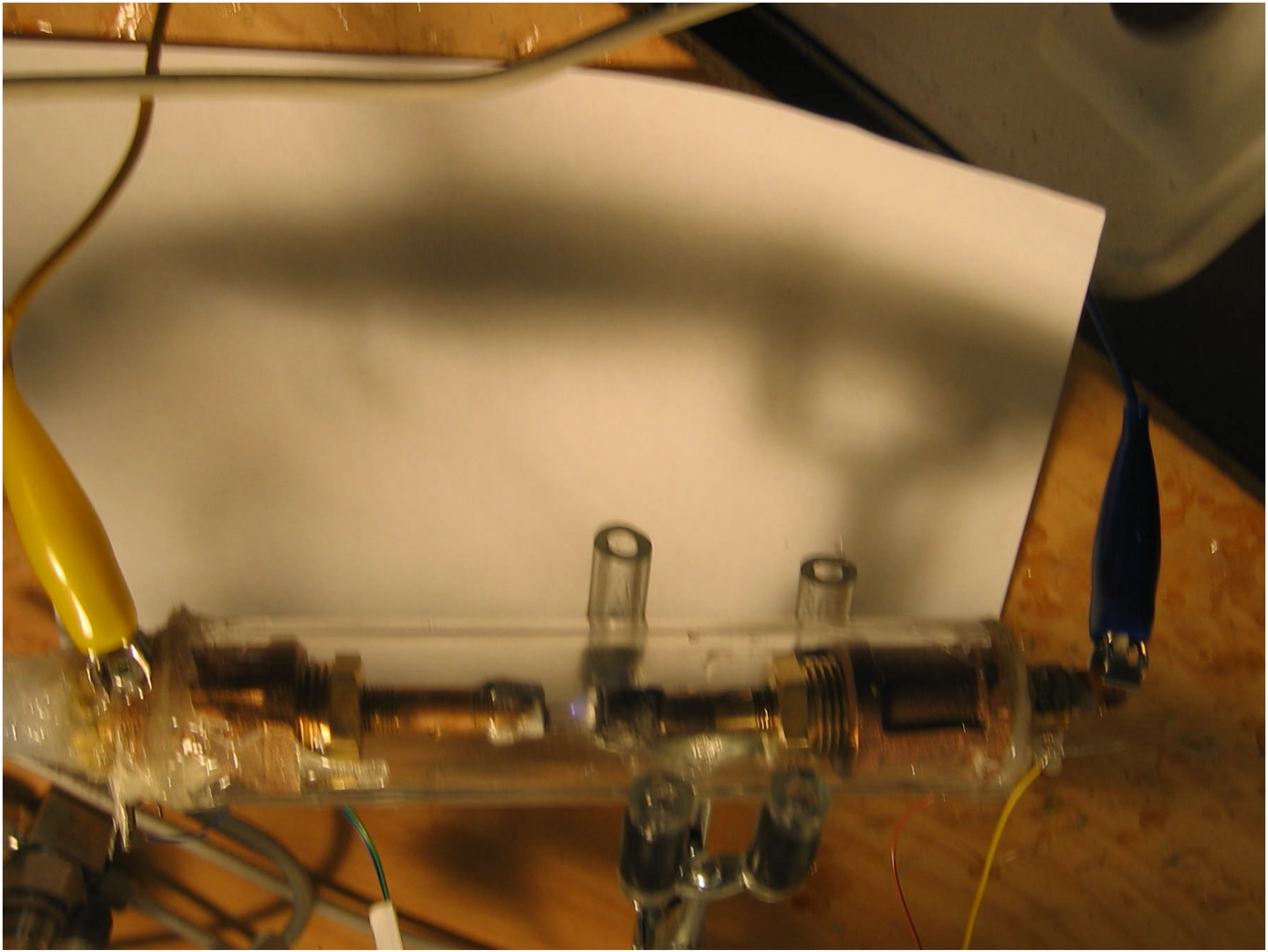
Power in	Watts Calcuated from Calorimeter					
DC Watts	Power Supply		Tube		Total	% of Power In
0.65	0.2467	37.95%	0.54318	83.57%	0.79	121.51%

Problems

- Proper Calibration with Resistive Heating – Heat Must Enter System Similar to Heat From the Discharge
- Difficult to Capture Heat Generated as Emitted Photons In Latest Linear Geometry
- Bleed Flow Must Exceed Background Gases from Air In-Leakage and Outgassing of Surfaces
- Discharge and Ambient Temperature Drift Must be Slower than the Time Constants for Achieving Thermal Equilibrium –Typically 40 to 150 minutes
- Large Ratios (~2) of Excess Heat over Input Still Detectable in Spite of Problems

CONCLUSIONS

- This System is able to Screen Many Combinations of Metals and Surface Structures on the Electrodes
- The Tubes are Inexpensive and Appear to Maintain Discharges for Several Days
- Obtaining High Surface Area Electrodes is One of the Next Steps
- Initial Results Encouraging for Pd Wire Cathodes



Porous alumina + pd nanotubes/wires