Technical Data Sheet

IsoSol-S100® Polymer-Wrapped Nanotubes

Ultra High-Purity Semiconducting SWNTs

Product Summary

The use of specialized dialkyl homopolymers developed by the National Research Council of Canada, within the Printable Electronics Consortium, has enabled us to disperse and extract single-walled carbon nanotubes to the highest levels of semiconducting enrichment and purity to date! The starting material is a purified RF-plasma grown carbon nanotube supplied by Raymor Nanotech[1].

UV-Vis-NIR spectrophotometric assessment of purity[2] indicate that this material has semiconducting purities at or greater than 99.9% with the metrics of Itkis Ratio[3] and Phi Values[4] exceeding 0.5 and 0.4, respectively.

The highly graphitized starting material and low sonication intensity utilized for the extraction technique minimizes damage to the nanotubes, allowing the material to exhibit high crysallinity and longer average lengths of 1µm, not previously seen when utilizing DGU[5] or Chromatography-based[6] separation methods.

Additionally, the material is processed to reduce the polymer : nanotube ratio to below a factor of four (factor of $1x10^3$ in our aqueous surfactant solutions) while promoting solution stabilities of greater than six months.

Experimentally, thin film transistors, prepared on SiO_2/Si substrates have led to average mobilities exceeding $27cm^2/(Vs)$ and On/Off ratios of $1.8x10^6$.[7]

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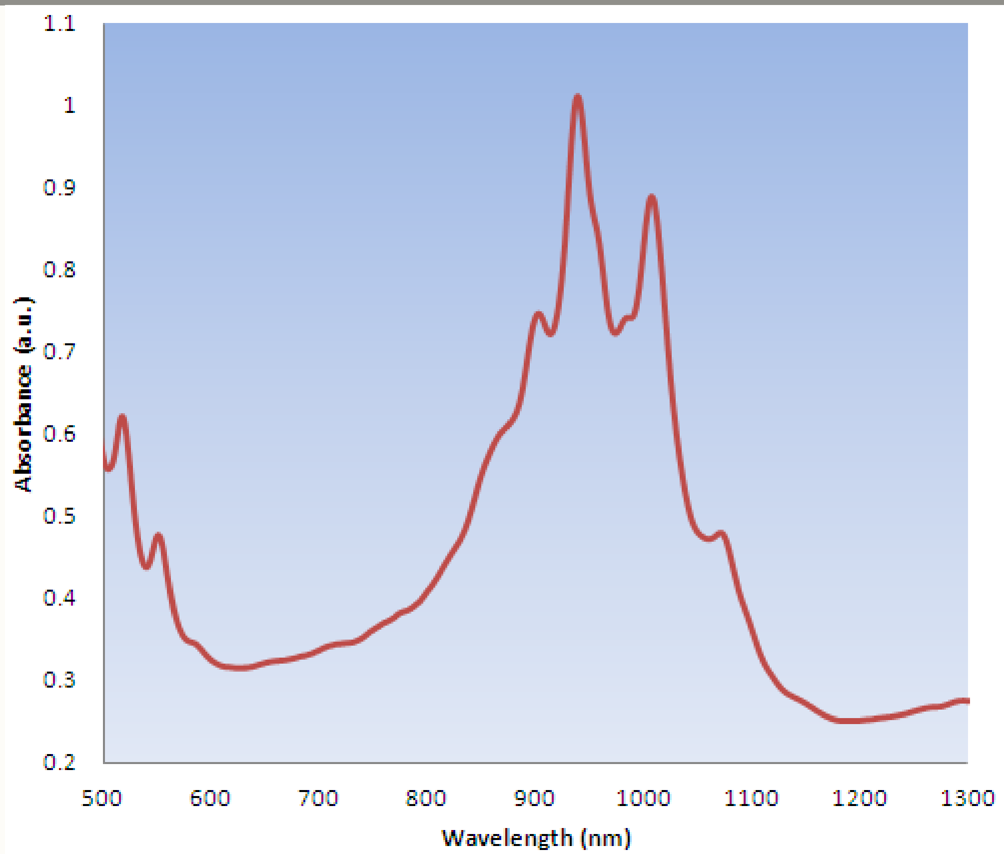
Product Specifications



Optical Purity	>99.9%
Itkis Ratio (Ï)	>0.5
Phi Value (Φ)	>0.39
Nanotube Concentration	>0.01mg/mL
Surfactant : Nanotube Concentration	<4
Standard Solvent Media	Toluene
Shelf Life	6-9 months

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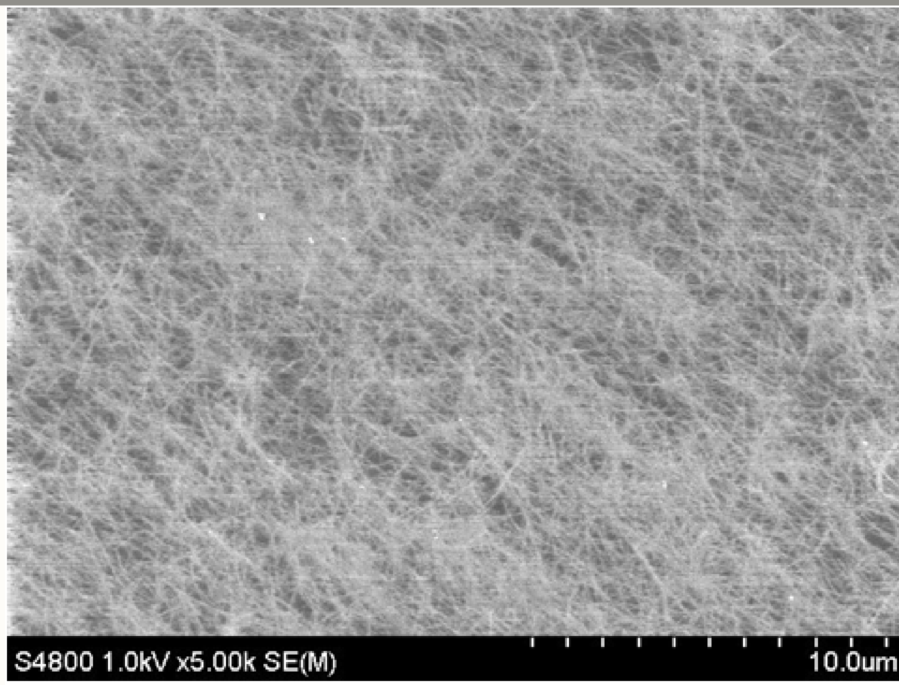
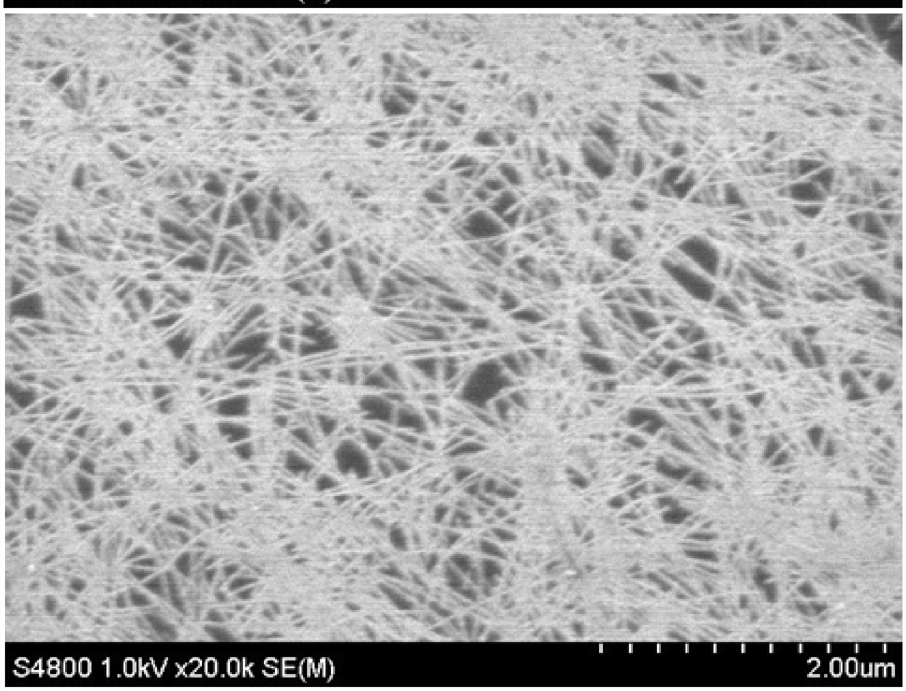
SEM





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Diameter Range	1.2 - 1.4nm
Mean Length	1 µm

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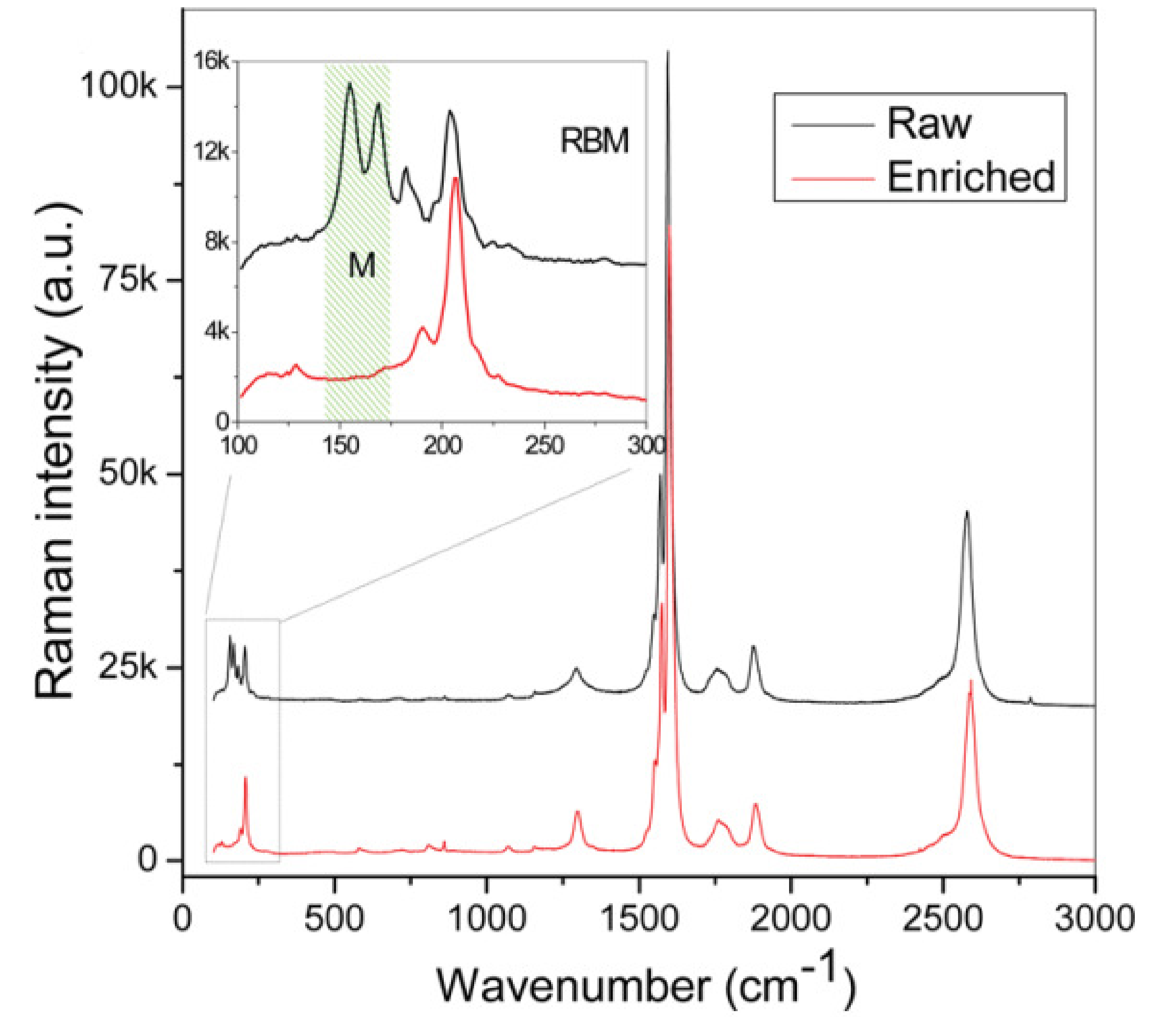
Raman



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The Radical Breath Mode (RBM) of the spectra excited at 785nm shows that the IsoSol-S100 material has a nearly flat baseline in the metallic region from 145 to 175 cm^{-1}, indicative of a high semiconducting purity.

Metal Catalyst Impurity	<0.5 %
Amorphous Carbon Impurity	<1 %

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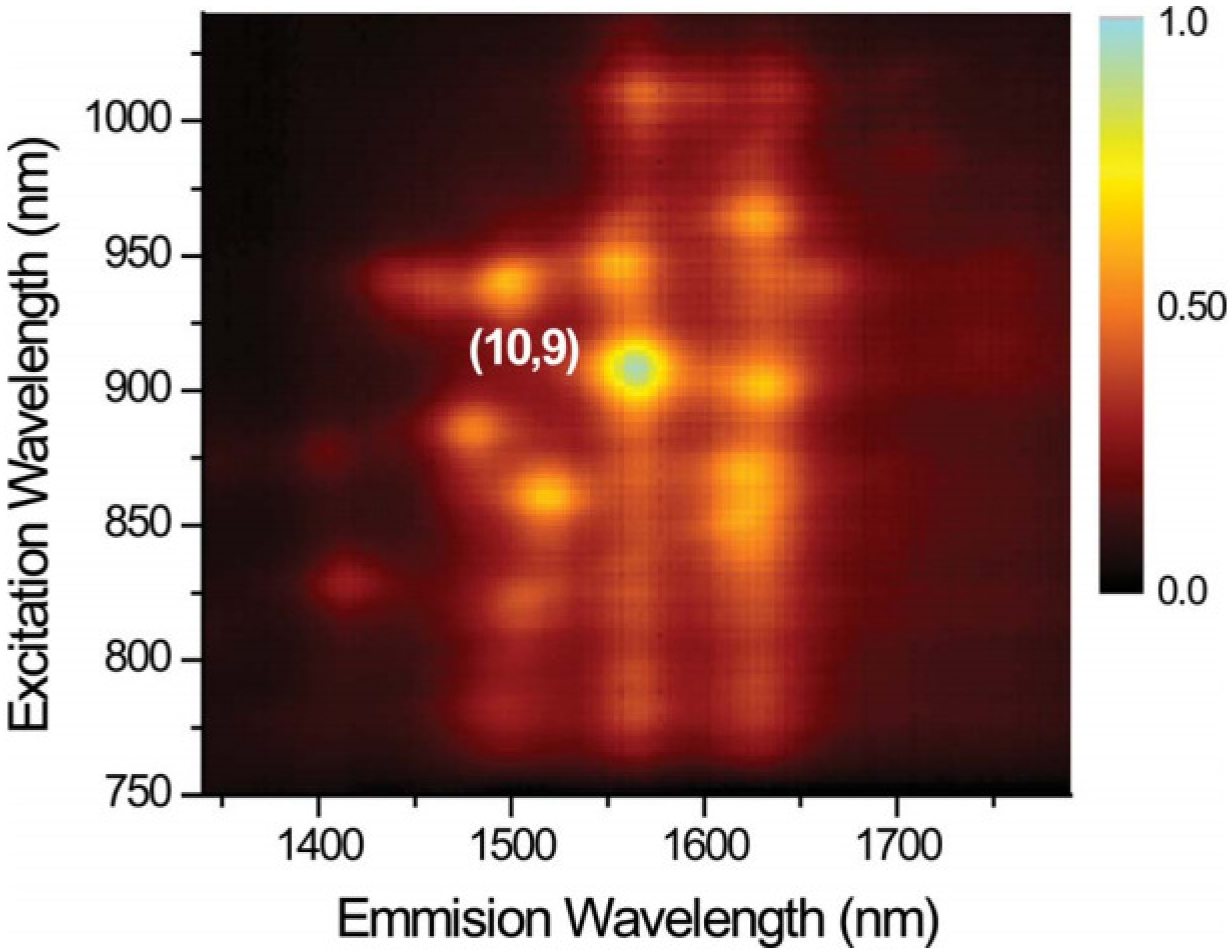
PLE Map



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A photoluminescence excitation (PLE) map for the IsoSol-S100 material shows well resolved (S_{22}, S_{11}) maxima, indicative of well separated nanotubes. UP to 19 (n,m) species contribute to the spectrum, with 8 or 9 having peak intensities higher than or close to 0.5. The (10,9) chirality peak with S_{11}=1570nm and S_{22}=910nm, proved to be the strongest.

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