



Technical Data Sheet

IsoSol-S100[®] Polymer-Wrapped Nanotubes

Ultra High-Purity Semiconducting SWNTs



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Product Summary

The use of specialized patent-pending 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: IsoSol-S100. The starting materials are the purified and highly-scalable RF-plasma grown carbon nanotubes supplied by Raymor Nanotech¹.

UV-Vis-NIR spectrophotometric assessment of purity² indicate that this material has semiconducting purities at or greater than 99.9% with the metrics of Itkis Ratio³ and Phi Values⁴ 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 crystallinity and longer average lengths of 1 μ m, not previously seen when utilizing DGU⁵ or Chromatography-based⁶ separation methods.

Additionally, the material is processed in organic solvent and the polymer/nanotube ratio can be adjusted to less than a factor of four with nanotube concentrations 10x higher than our aqueous dispersions. The solutions also display stabilities of greater than six months. These properties promote great nanotube deposition and adhesion for device creation.

Experimentally, thin film transistors, prepared on SiO₂/Si substrates⁷ have led to average mobilities exceeding 27cm²/(Vs) and On/Off ratios of 1.8x10⁶ and is perfectly-suited for commercial ink jet and aerosol jet printing.

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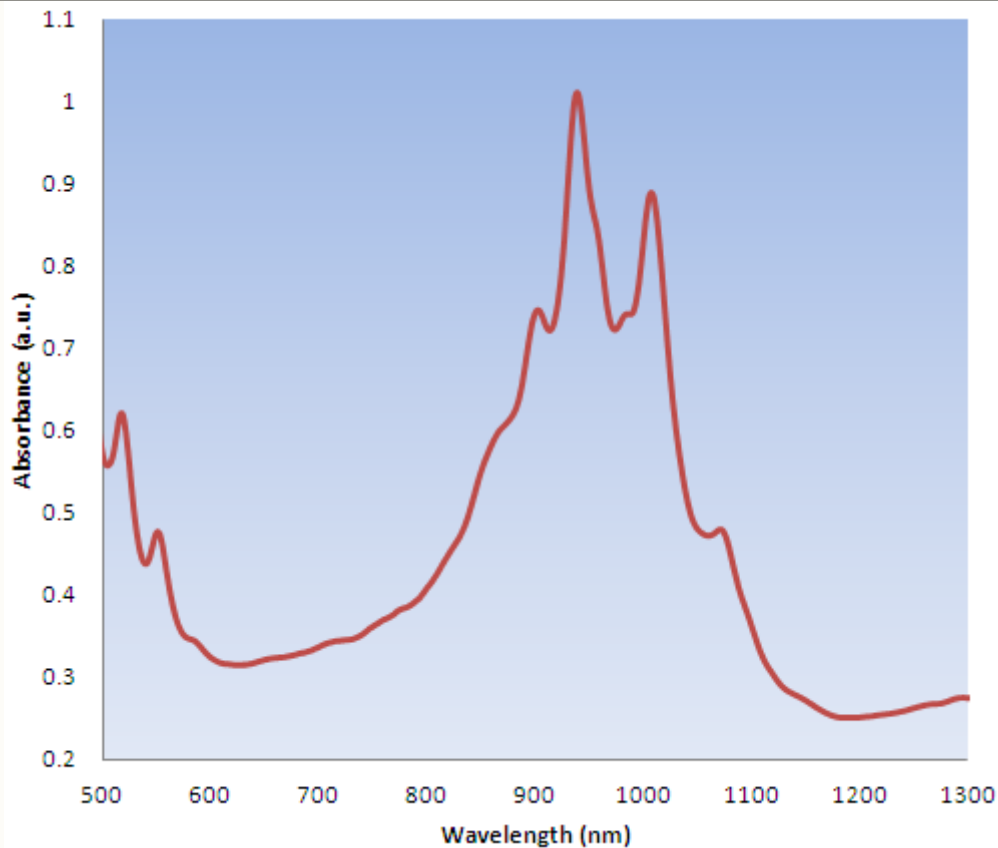
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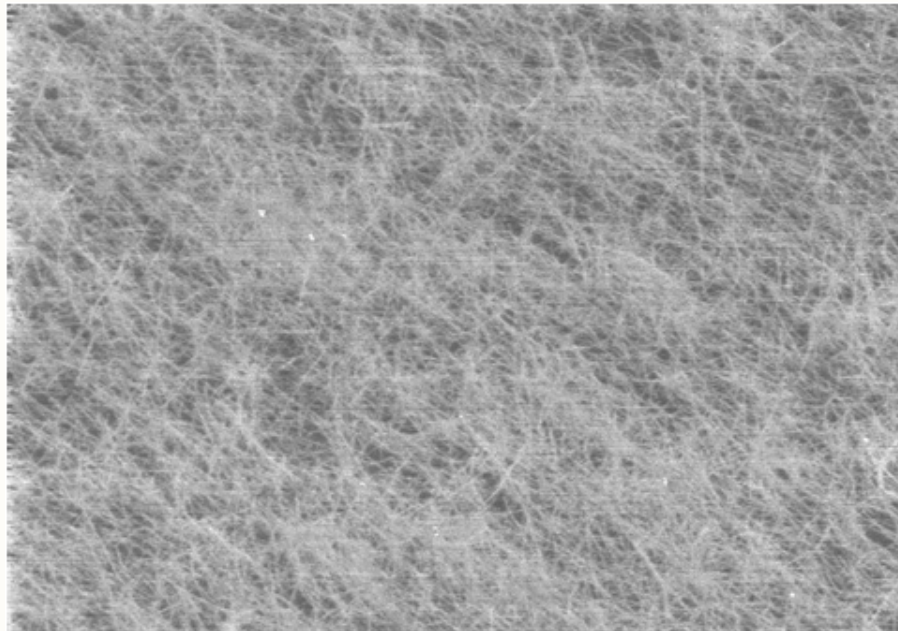
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Product Specifications

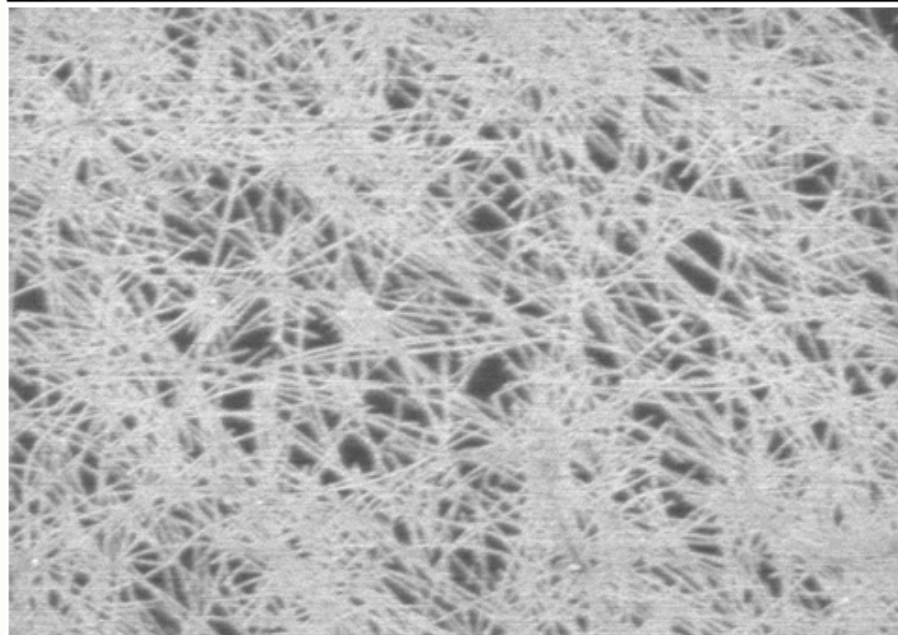


Optical Purity	>99.9%
Irkis Ratio (İ)	>0.5
Phi Value (Φ)	>0.39
Nanotube Concentration	>0.01mg/mL
Surfactant : Nanotube Concentration	<4
Standard Solvent Media	Toluene
Shelf Life	6-9 months

SEM and AFM



S4800 1.0kV x5.00k SE(M) 10.0um



S4800 1.0kV x20.0k SE(M) 2.00um

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SEM and AFM

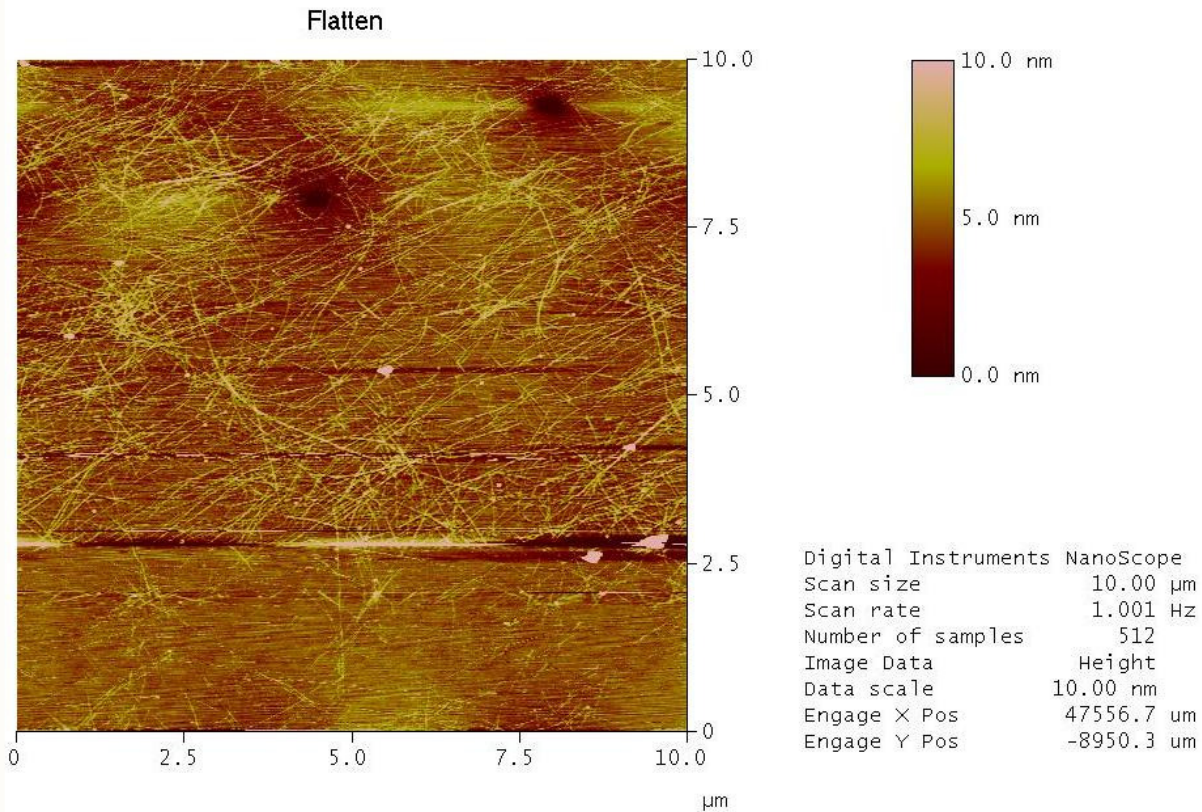


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Diameter Range	1.2 - 1.4nm
Mean Length	1 μm

Raman

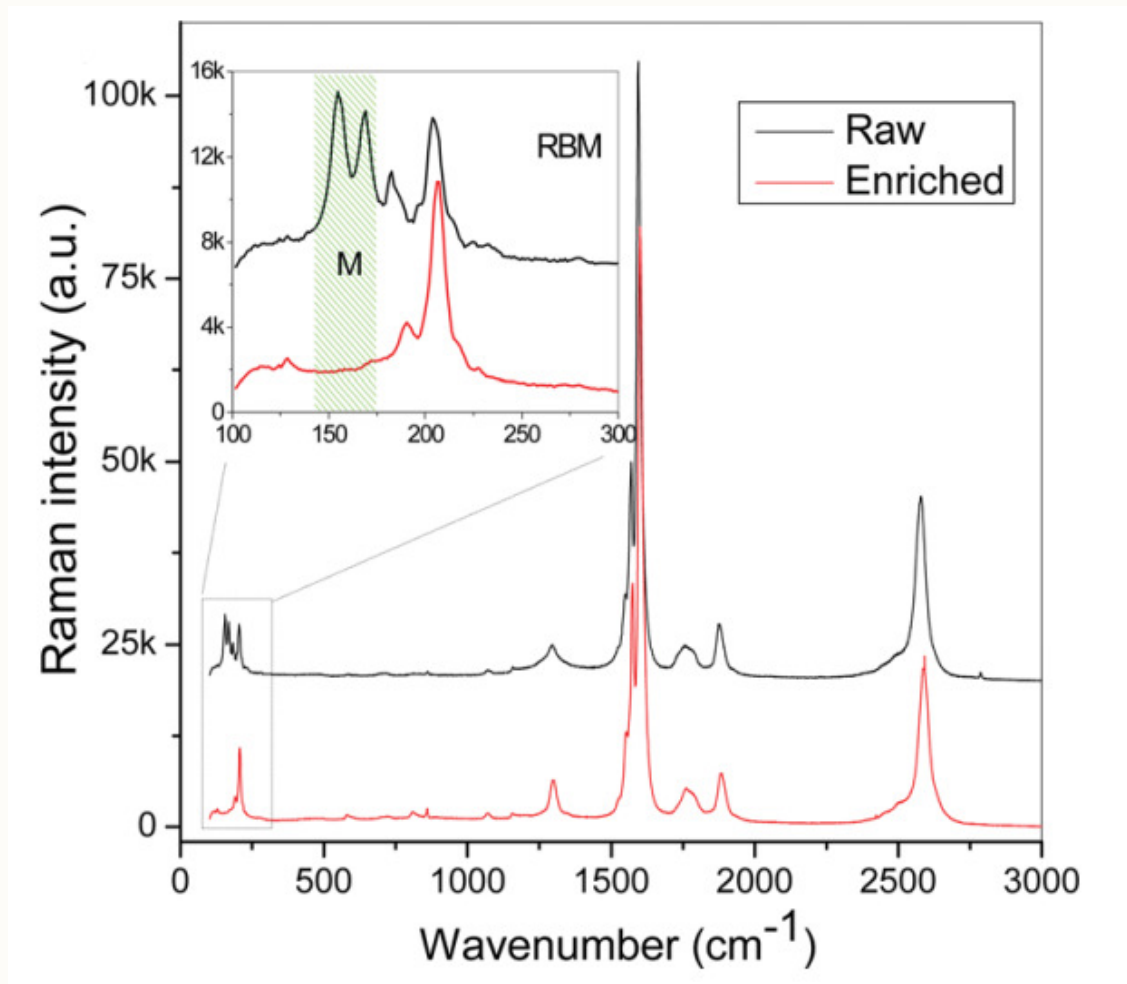


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The Radical Breath Mode (RBM) of the spectra excited at 785nm shows that the IsoSol-S100 material has a nearly flat baseline in the metallic region from 145 to 175 cm^{-1} , indicative of a high semiconducting purity.

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

PLE Map

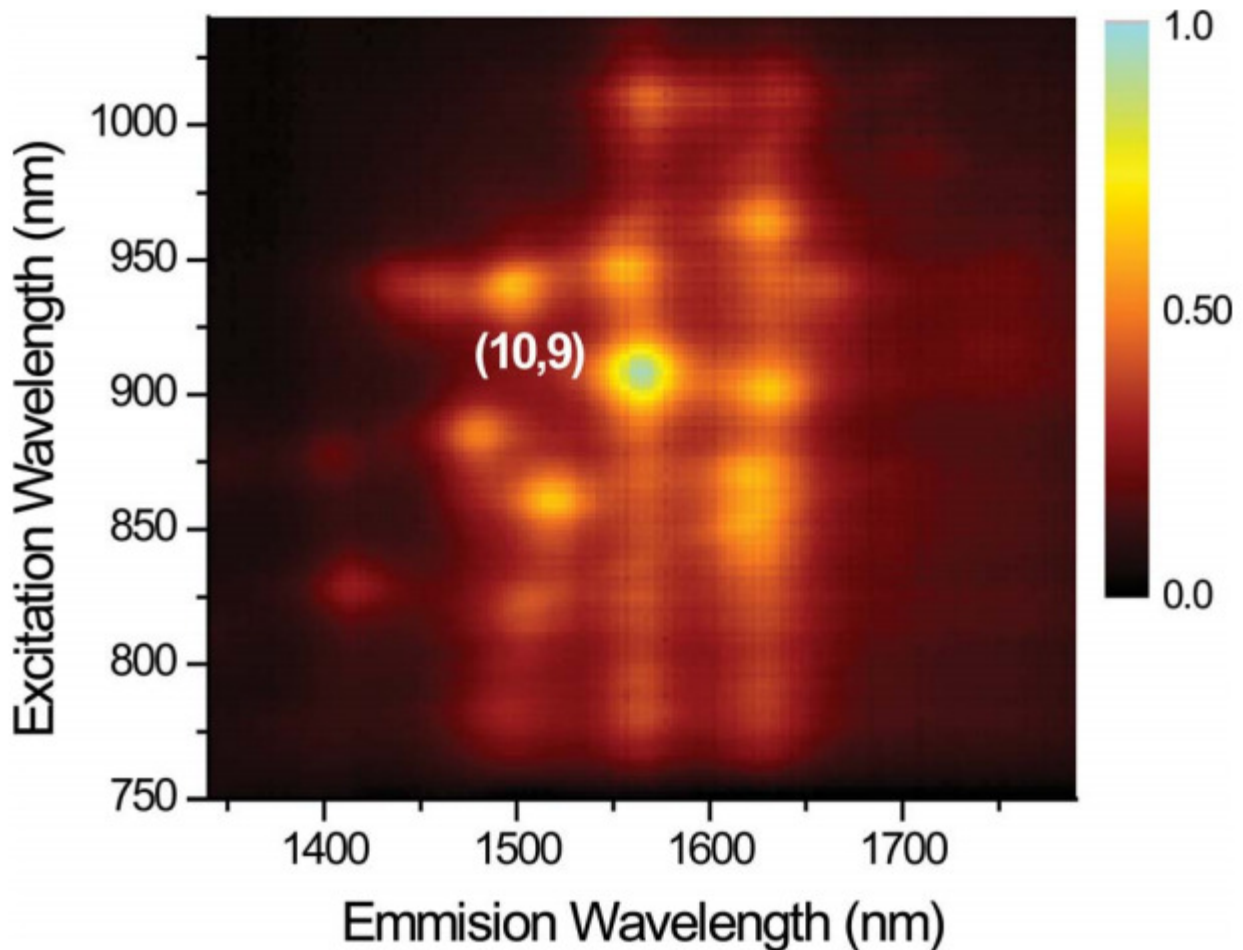


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A photoluminescence excitation (PLE) map for the IsoSol-S100 material shows well resolved (S_{22}, S_{11}) maxima, indicative of well separated nanotubes. UP to 19 (n,m) species contribute to the spectrum, with 8 or 9 having peak intensities higher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