

Description

ZNT-WTM is a polymer modified multi-wall carbon nanotube additive that can be used for aqueous solutions and applications for epoxies, epoxy-based coatings, inks, and other aqueous based materials including bio-applications.

Mixing Procedure

ZNT-W is a polymer modified multi-wall carbon nanotube additive that is easily integrated into a wide range of aqueous based solutions. The following mixing procedure typically produces the best results:

Solvent dispersions:

Accurately weigh 100-200 mg ZNT-W into 100 ml of solvent and process the materials using water bath sonicator or probe sonicator at 50-60 watts of power. Alternatively, high-shear mixing can also be used in making solvent dispersions. When using high-shear mixing, typically 4000 - 6000 RPM is needed to disperse ZNT-W into water. Both sonication and high-shear mixing processes result in generation of heat. However, keeping the contents at temperatures below 10°C will typically reduce the processing times and improve the quality of dispersions. ZNT-W is associated with a slight excess of a proprietary polymer (non-covalent functionalization agent). The excess polymer aids the dispersion of MWNTs into solvents. During the first few minutes of the sonication or high-shear mixing process, the ZNT-W suspension may have slight red color. The suspension gradually becomes black with continued processing. Applications that need a high dispersive state of ZNT-W in water may need to follow up with ultra-centrifugation process. ZNT-W water suspensions can be centrifuged at 3000 - 4000 RPM for 30 minutes (depending on the specific centrifuge) to remove larger agglomerates as needed.

Safety Handling

Zyvex Technologies provides its customers with a product-specific Material Safety Data Sheet (MSDS) to cover potential health effects, safe handling and use information. Zyvex encourages its customers to review all relevant MSDS prior to use.

Disclaimer

Zyvex Technologies believes that the technical data provided is accurate as of the published date. Performance values and material specifications are considered representative but are not intended as a specification and there may be small variations from lot to lot of product.

Material Specifications

Table 1: ZNT-W Specification

| Characteristic | Unit of Measure | Value | Method of Evaluation |
|----------------------|-----------------|--------|----------------------|
| Carbon content | wt% | 90 | Elemental analysis |
| Functional chemistry | wt% | 8 - 15 | TGA |
| CNT outer diameter | Nanometer | 10-15 | Arkema * |
| CNT length | Microns | 0.1-10 | Arkema * |

*Properties established by the MWNT supplier

*Other CNT manufacturers may be used upon request or at Zyvex Technologies' discretion

Table 2: Material Characteristics

| Characteristic | ZNT-W |
|----------------------------------|-----------------------------|
| Color | Black |
| Nanomaterial | Multi-wall carbon nanotubes |
| Appearance | Powder |
| Total Solids, weight % | 99% |
| Shelf Life | 12 months |
| Typical loading level by weight% | 0.5% - 10% |

Table 3: Particle Size Analysis Verification and Surface Area Inspection

| Characteristic | ZNT-W |
|--|--------------------------|
| Single Point Surface Area | 124.2 m ² /g |
| BET Surface Area | 126.3 m ² /g |
| Langmuir Surface Area | 190.3 m ² /g |
| Single Point Adsorption Pore Volume, less than 40 nm in Diameter | 0.450 cm ³ /g |
| Adsorption Average Pore Diameter | 14.25 nm |

Figure 1: Particle Size Analysis: Dynamic Light Scattering of ZNT-W in DI Water

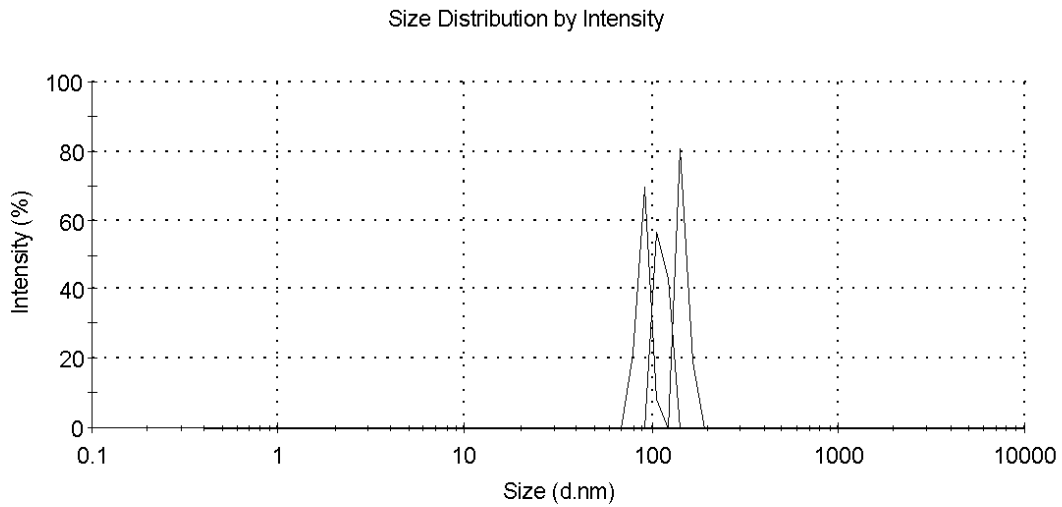


Figure 2: SDT of ZNT-W at 10°C/min in Argon

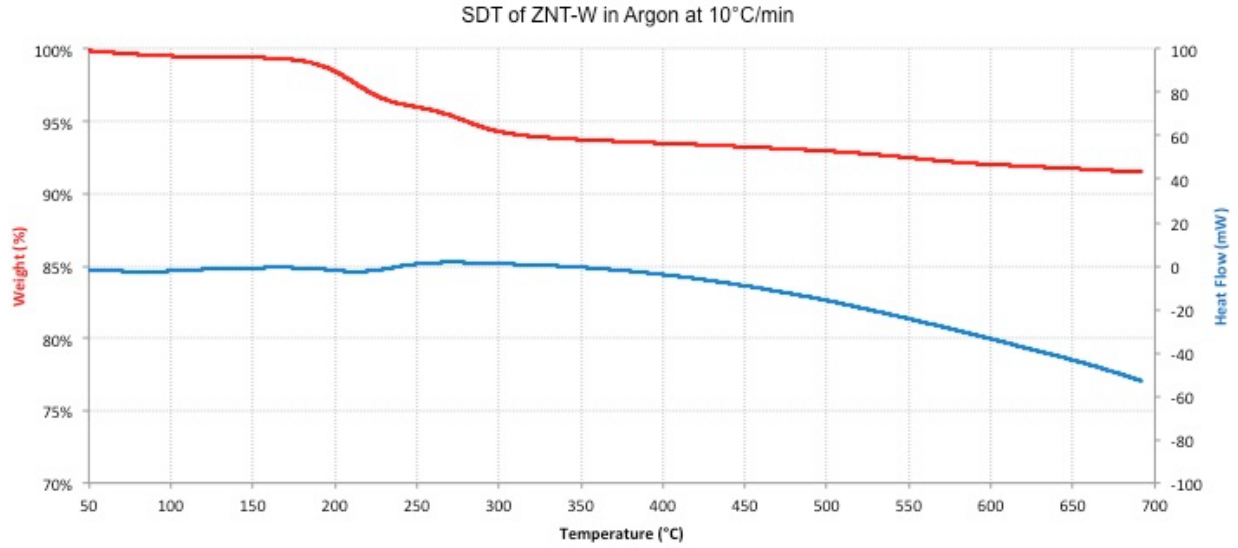
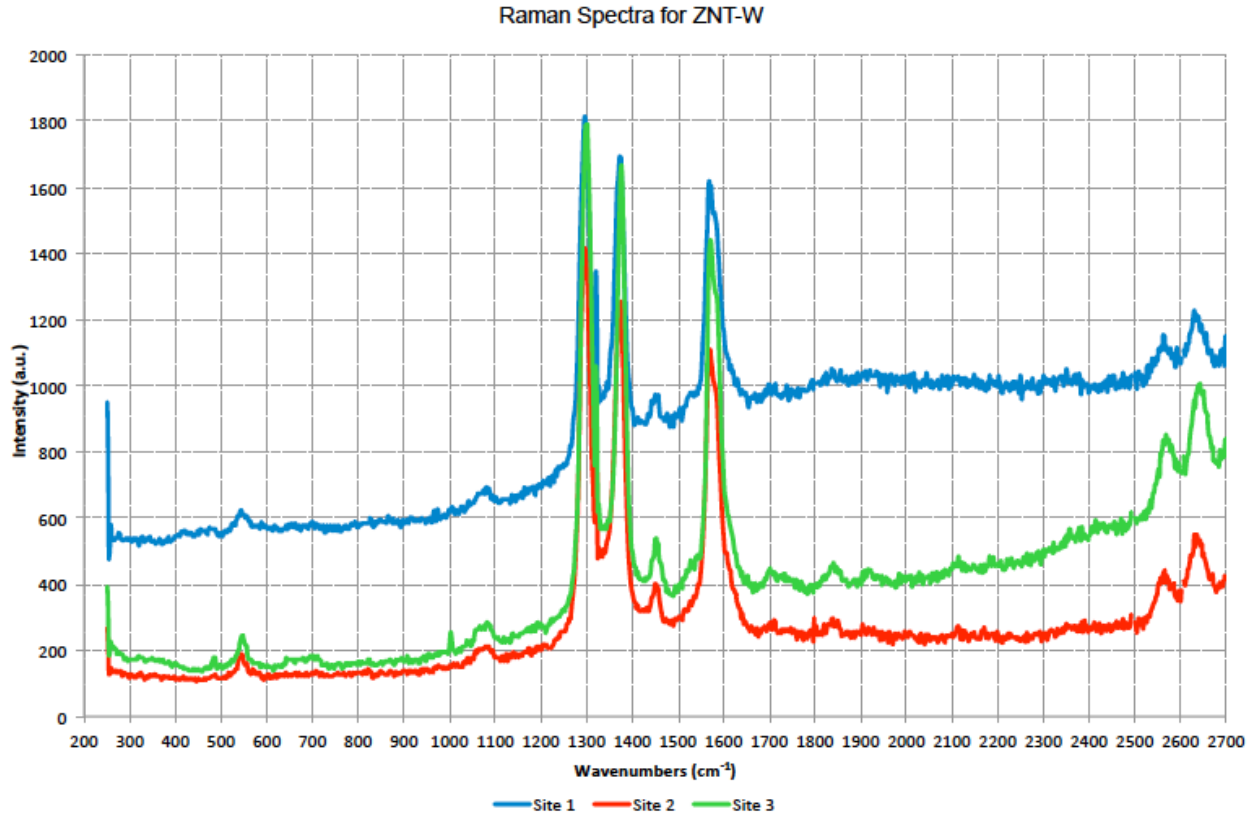


Figure 3: Raman spectrograph of ZNT-W



Contact Zyvex

For United States quotes, orders and product information call toll free 877.Go.Zyvex (877.469.9839).

For international quotes, orders and product information call 614.481.2209.

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