The Examples of Hydrophilic Liquids in K-kit
(RD201225001)

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2021/1/06

- **Purpose**

  To provide the examples of TEM images that observed with hydrophilic liquids in K-kit.

- **Sample solution**

  (1) Aluminum oxide (Al_2O_3, OD 80nm) nanoparticles, 20wt% fully dispersed in NMP. (Vendor: https://www.us-nano.com/inc/sdetail/208)

  (2) Multi-walled carbon nanotubes (WMCNT, OD 30-80 nm, Length <10 μm), 10wt% fully dispersed in Water. (https://nanoamor.com/inc/sdetail/53281)

- **Sample preparation**

  - We use gap2um/ SiN30nm K-kits in the sample preparations. (All by Thin Layer mode, partially dried in K-kit)
  - Without any dilution to the liquid samples

- **TEM for observation**

  Hitachi HT7700 TEM @ 100KV

Example(1): Al$_2$O$_3$ nanoparticles in NMP
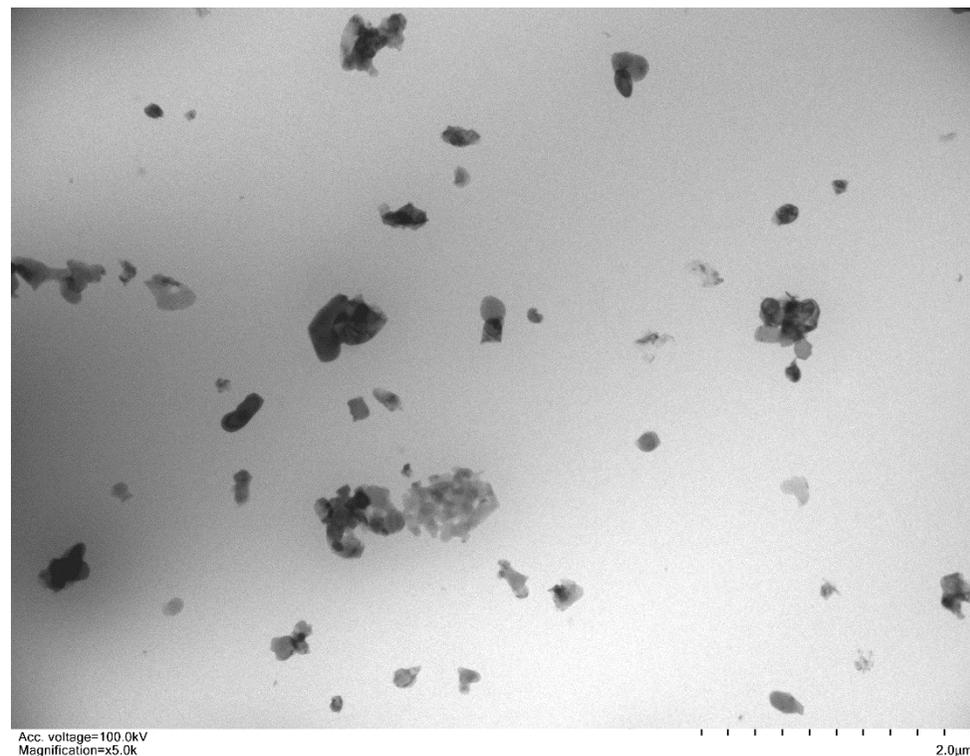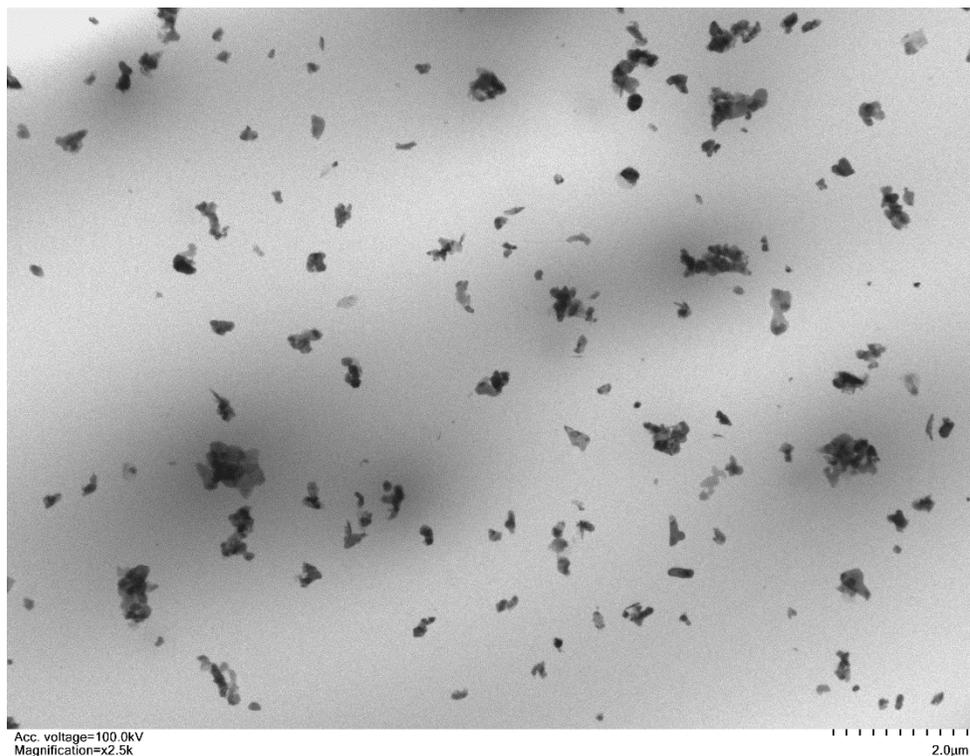
As shown the TEM imaging results, Al$_2$O$_3$ nanoparticles were evenly distributed in NMP solution basically.

Example(1): Al$_2$O$_3$ nanoparticles in NMP
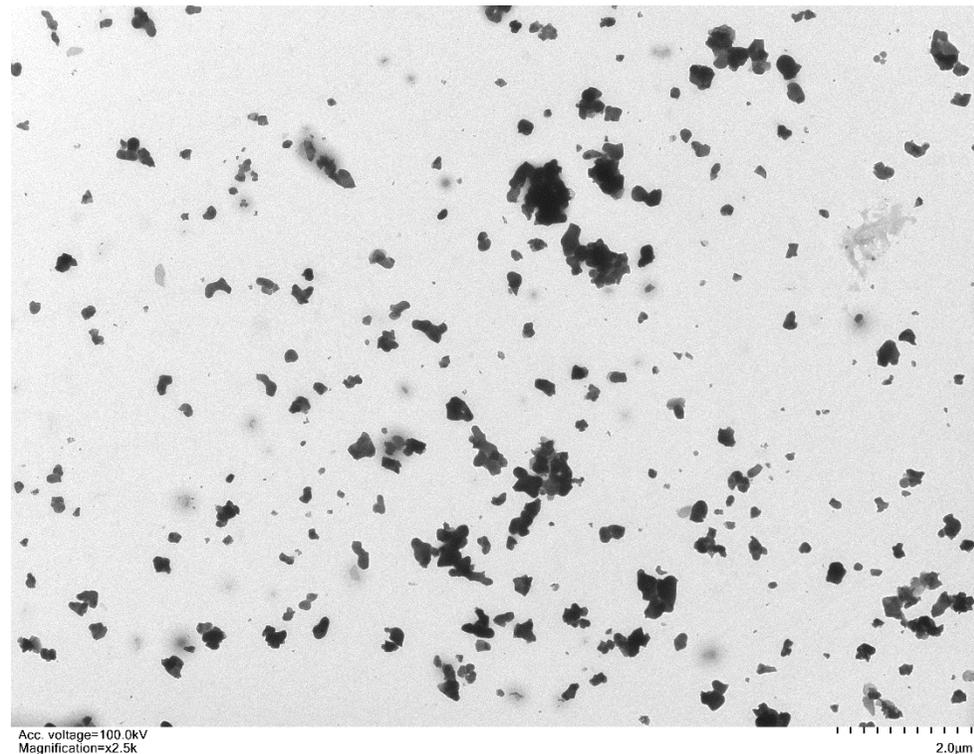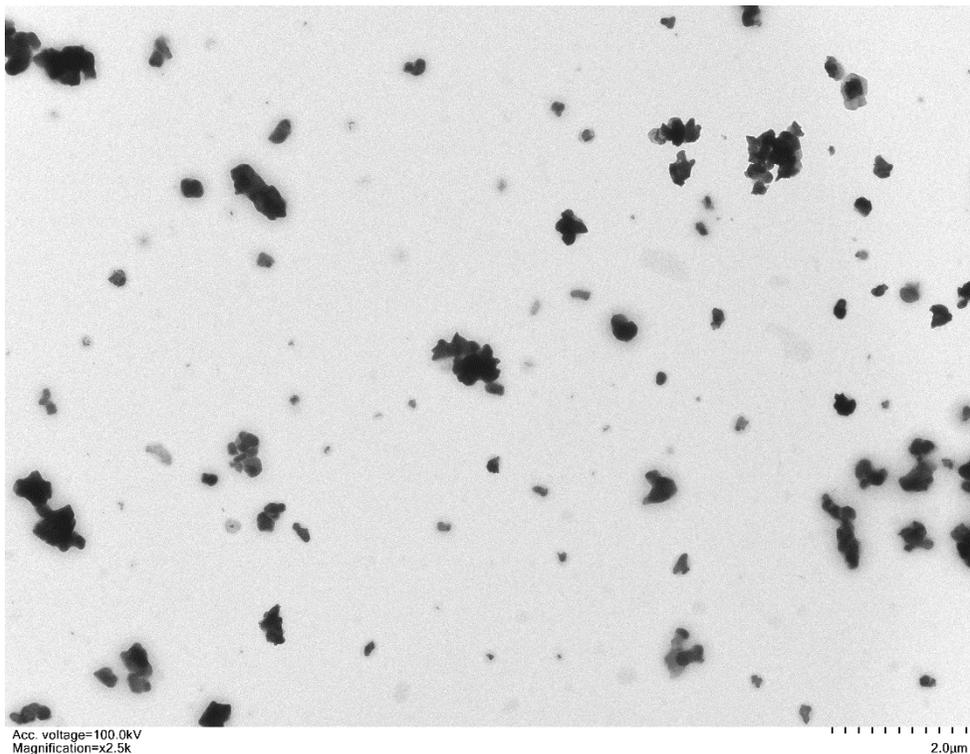
The nanoparticles in NMP were likely comprised of two groups, primary (Individual) and secondary (Originally aggregated) particles.

Example(1): Al$_2$O$_3$ nanoparticles in NMP
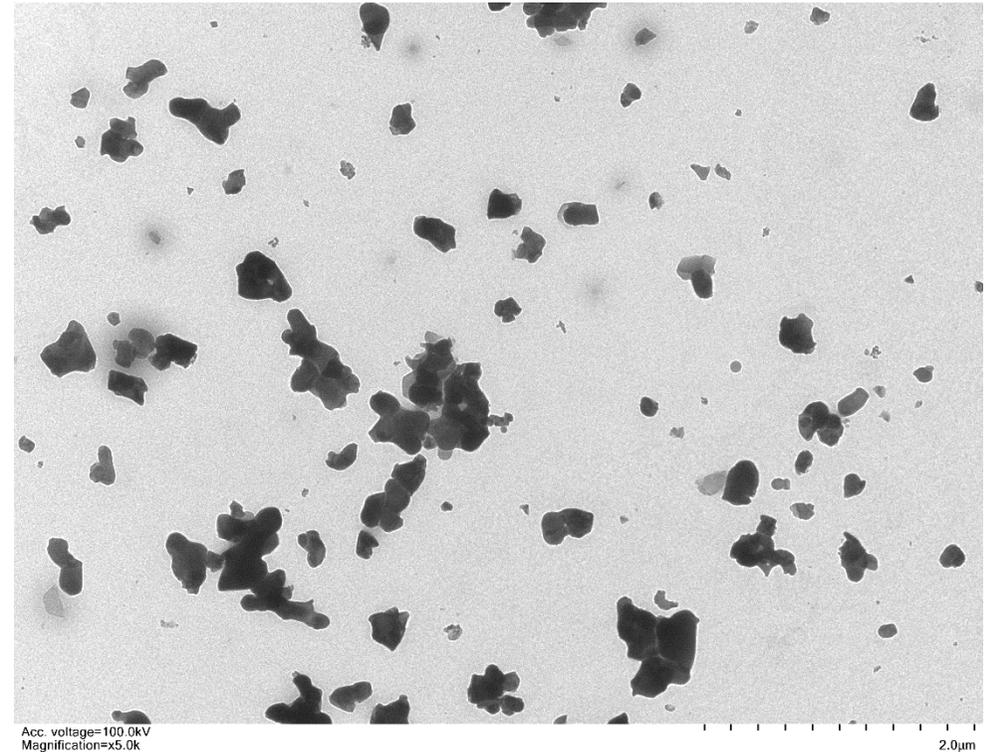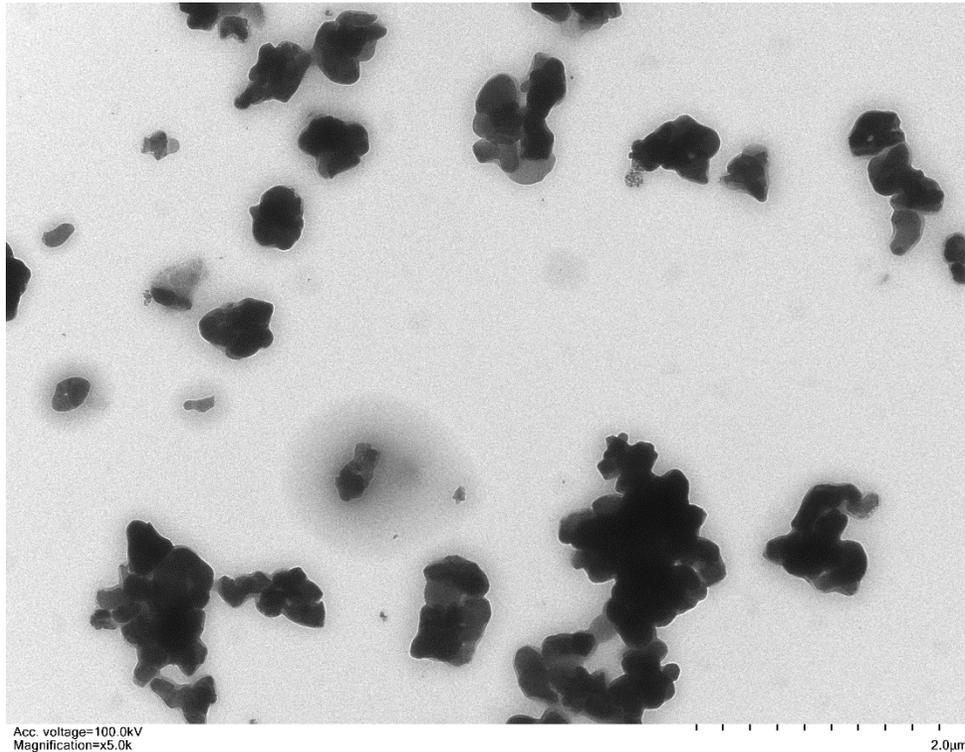
In this hydrophilic solution (NMP), there're some secondary particles to be observed with the aggregated granule sizes larger than 1,000nm.

Example(2): WMCNTs in water
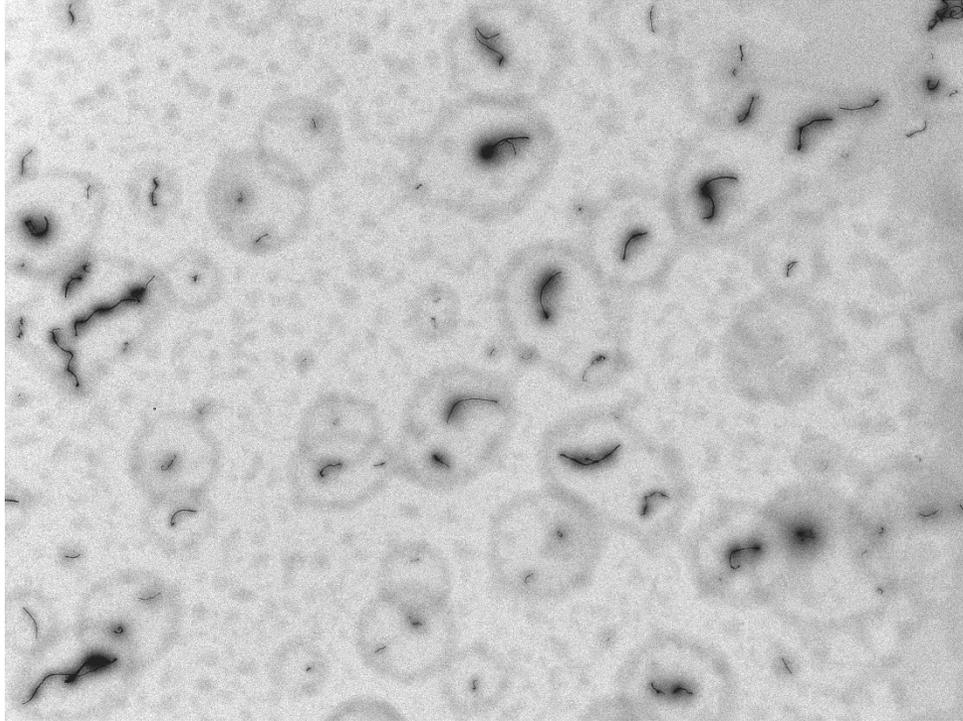
As shown the TEM imaging results, WMCNTs were evenly distributed in water.

Example(2): WMCNTs in water
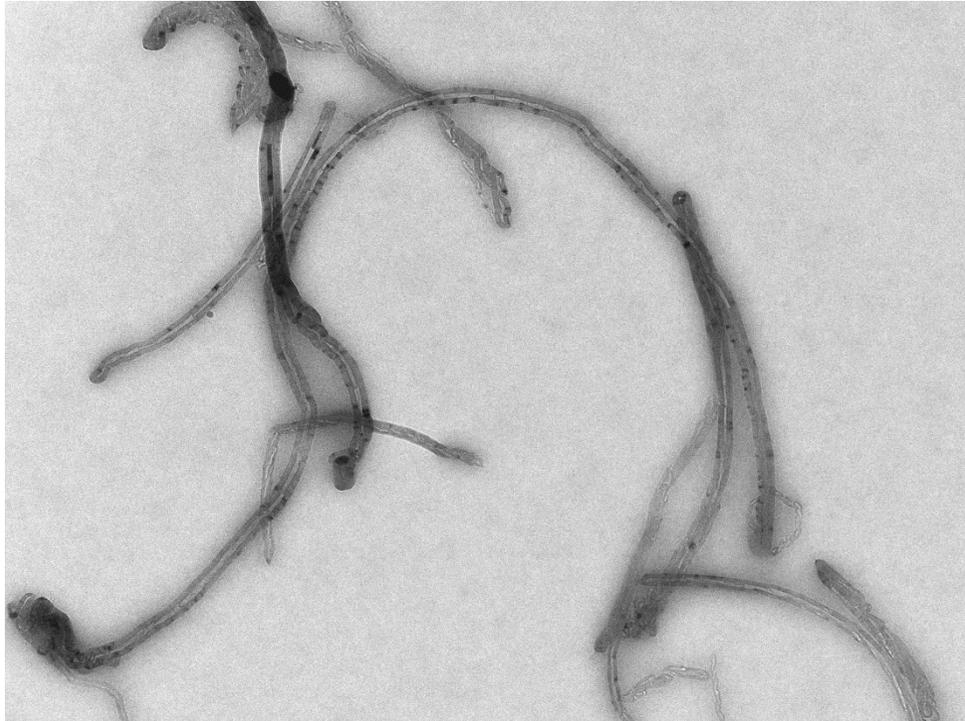
The multi-walled tubular structures of MWCNTs could be observed clearly by using K-kit.

Example(2): WMCNTs in water

Each of MWCNTs could be observed with a few node-like structures along the nanotube.

Example(2): WMCNTs in water

Acc. voltage=100.0kV
Magnification=x100k
100nm

Acc. voltage=100.0kV
Magnification=x100k
100nm
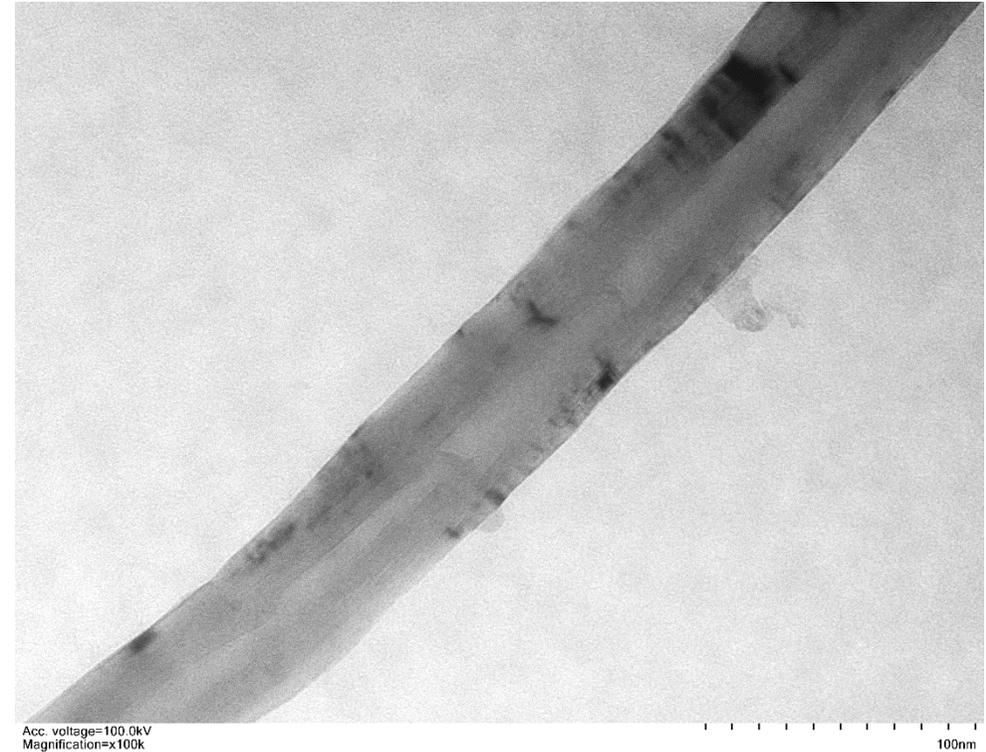
By the imaging results under a larger magnification, the tubular microstructures of MWCNTs were all with multiple walls to form their outer shells.

● **Test Result and Conclusion**

1. In this test, we used gap2um/ SiN30nm K-kits which prepared by Thin Layer mode (Partially dried in K-kit) on the sample preparation. The imaging results showed that the Al_2O_3 nanoparticles and MWCNTs were all to spread uniformly in the liquids NMP and water individually.

2. In the hydrophilic NMP solution, the nanoparticles were likely comprised of two groups, primary (Individual) and secondary (Intrinsically aggregated) particles.

3. By the imaging results of K-kit, the MWCNTs were seemingly with node-like structures. Meanwhile, the tubular microstructures of MWCNTs were also observed with multiple walls to form the outer shell.

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