



2013/09/04  
Admatechs Co., Ltd  
R&D Division

# High flowability and dispersibility fillers for compounds

## Application of nano silica (ADMANANO)

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Admatechs Co., Ltd.

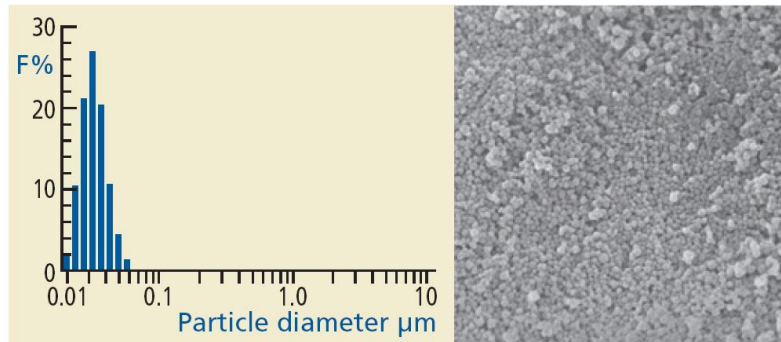


# Features of uniformly dispersible nano silica, ADMANANO

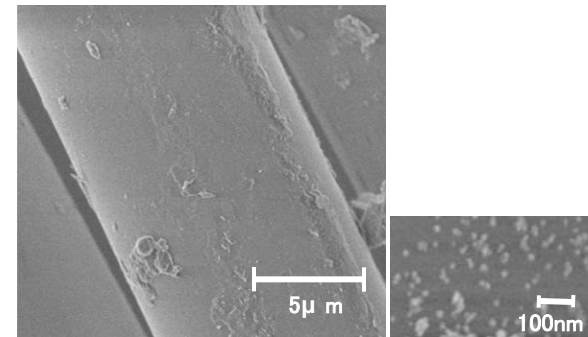
## Features

1. Nano silica which has 10nm average diameter
2. Perfect dispersion for primary particles with simple mixing
3. Controlled surface by special treatment

Particle size distribution/SEM image



ADMANANO dispersion to glass fiber



ADMANANO dispersion to organic substance



ADMANANO powder



+ Solvent



Simple shaking



Excellent dispersion  
without dispersant

Solvent: MEK  
Silica loading: 50wt%

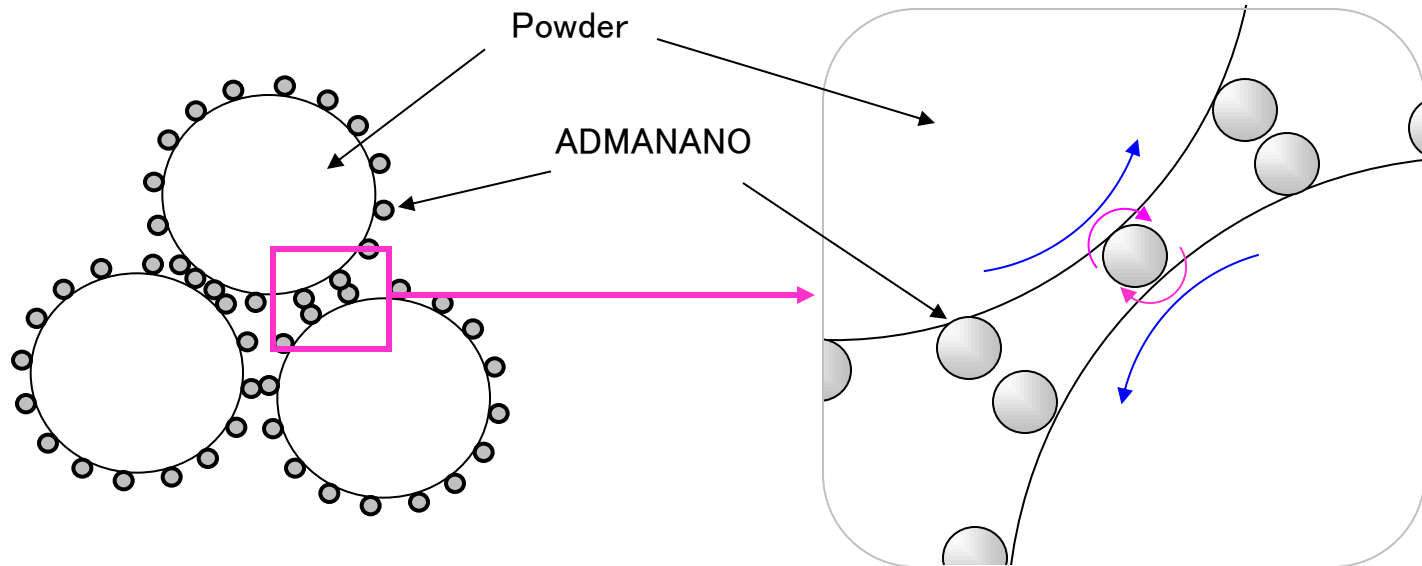
# Effect of ADMANANO

## Effect for other fillers

Powder flowability is improved by small adding of ADMANANO.

ADMANANO acts like a ball bearing between main particles.

ADMANANO blocks contacts of each particles and reduces agglomerations.



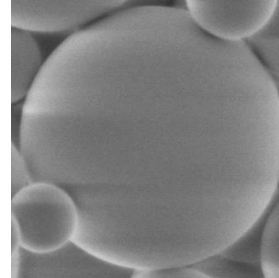
# Effect for spherical filler

## Application for submicron silica

ADMAFINE Silica is spherical silica which has submicron particle size.

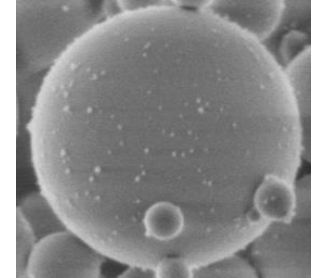
Submicron fillers have high aggregability and difficulty of stable feeding. Nano Silica can improve the flowability and feedability of fillers.

ADMAFINE



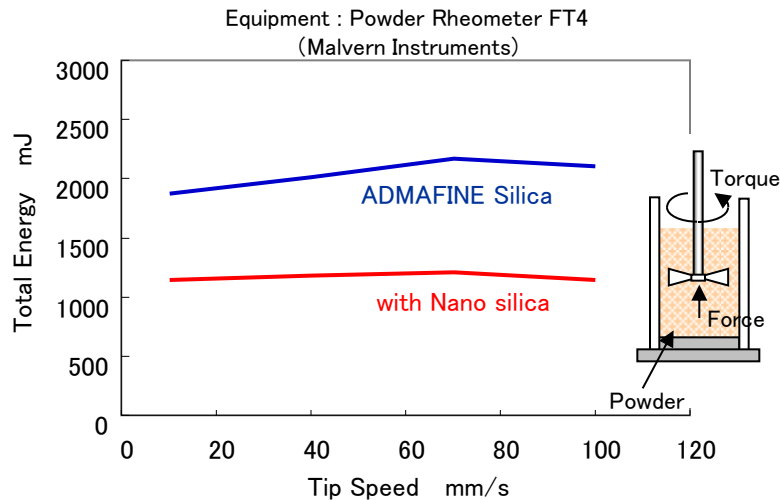
Average particle size : 0.5um

ADMAFINE with Nano silica



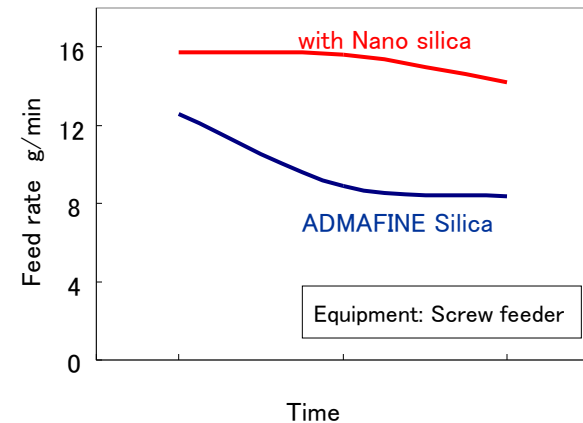
Product number : SC200G-SQV  
(includes 0.6wt% of Nano silica)

## Powder flowability



Flowability is improved by Nano Silica.

## Feedability



Flowability is improved by Nano Silica.

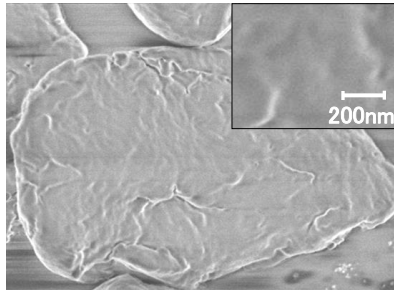
# Effect for organic filler/ Improvement of flowability in resin

## Application for PTFE powder

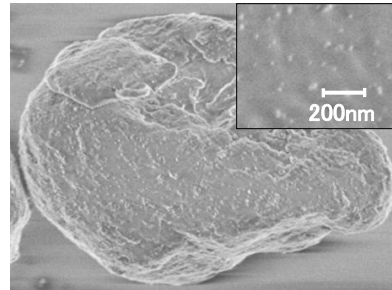
PTFE powder is used for molding compound, sliding material, flame retardant and additive for paint, but to disperse to resin is quite difficult.

Nano silica can improve the flowability of PTFE and the viscosity of compound is decreased.

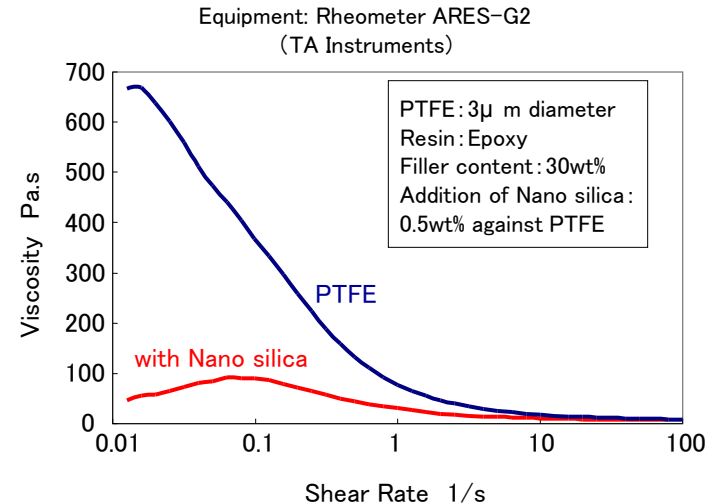
PTFE



PTFE with Nano silica



## Viscosity of PTFE dispersed resin

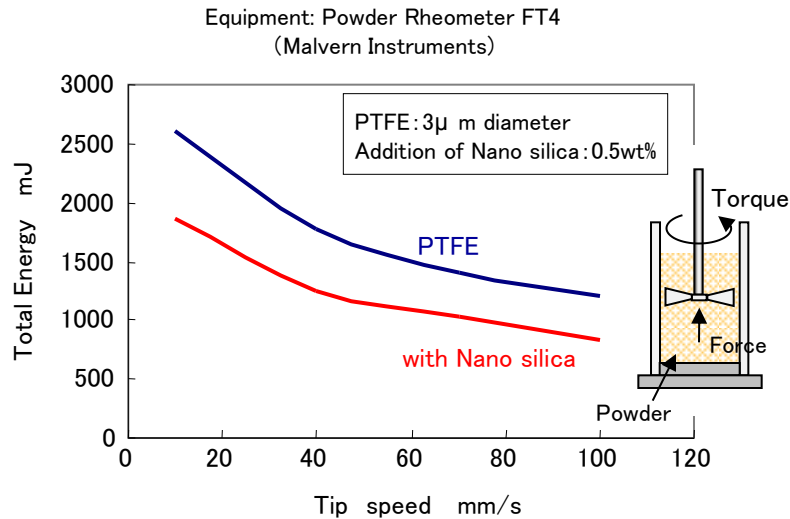


Compound viscosity is decreased dramatically.

# Effect for organic filler/Improvement of powder flowability

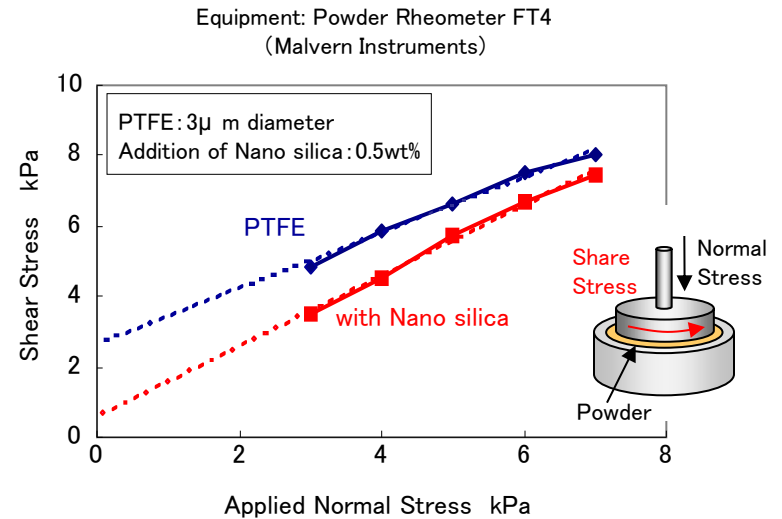
## Application for PTFE powder

### Powder Flowability



Flowability is improved by Nano silica

### Shear stress

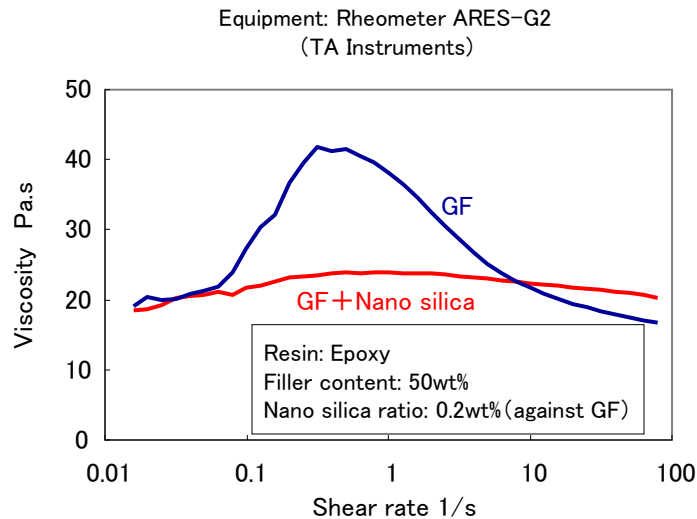


Frictional force is decreased by Nano silica

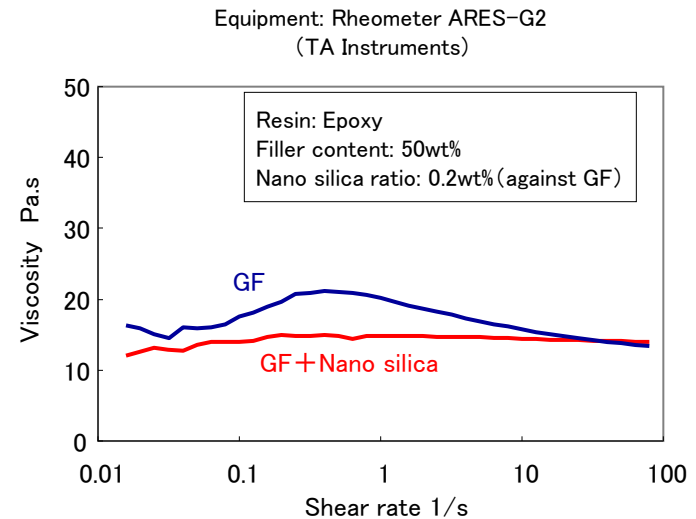
# Effect for fiber/Improvement of flowability in resin

## Application for Glass fiber

### Resin rheology (fiber length is 70 $\mu$ m)



### Resin rheology (fiber length is 30 $\mu$ m)



Nano silica can reduce the viscosity of resin compound with GF.

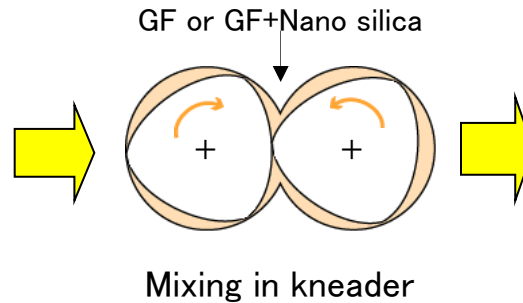
# Effect for fiber/Improvement of defiberization of chopped strand

## Application for chopped strand

GF



GF + Nano silica



GF: Fiber length 3mm  
Rotation of blade: 50rpm  
Mixing time: 10min  
Addition of Nano silica: 0.2wt%  
Sample weight: 5g

Nano silica can control the electric statics

Charge potential

GF : 2kV

GF+Nano silica : 0.8kV

Nano silica can improve the defiberization

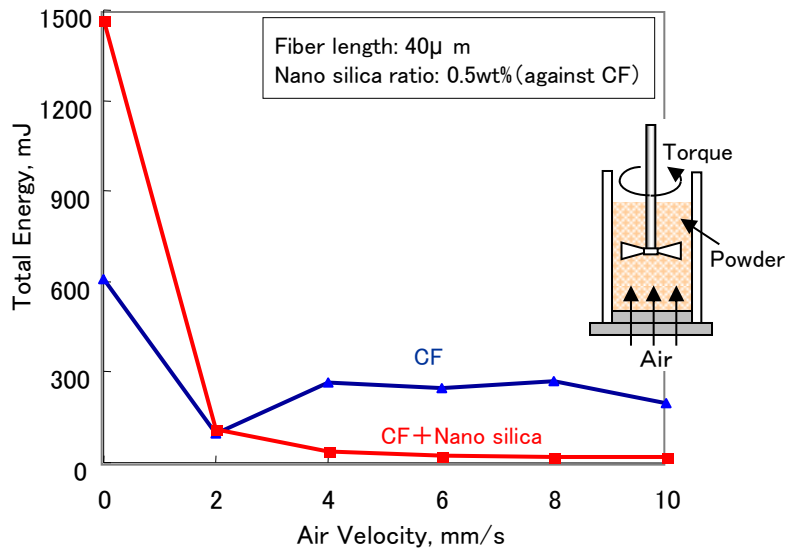


# Effect for fiber/Improvement of powder flowability and resin rheology

## Application for Carbon fiber

### Powder Flowability

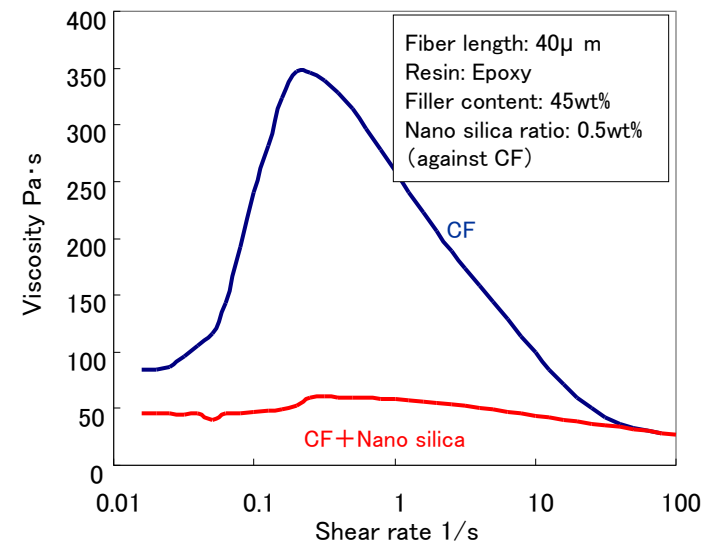
Equipment: Powder Rheometer FT4  
(Malvern Instruments)



The powder flowability is improved

### Resin rheology

Equipment: Rheometer ARES-G2  
(TA Instruments)

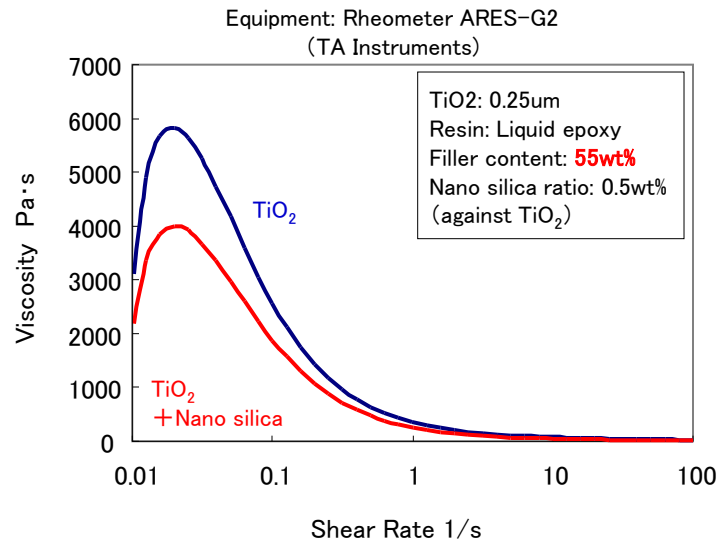


The resin viscosity is decreased dramatically.  
High filler loading is possible.

# Effect for pigment

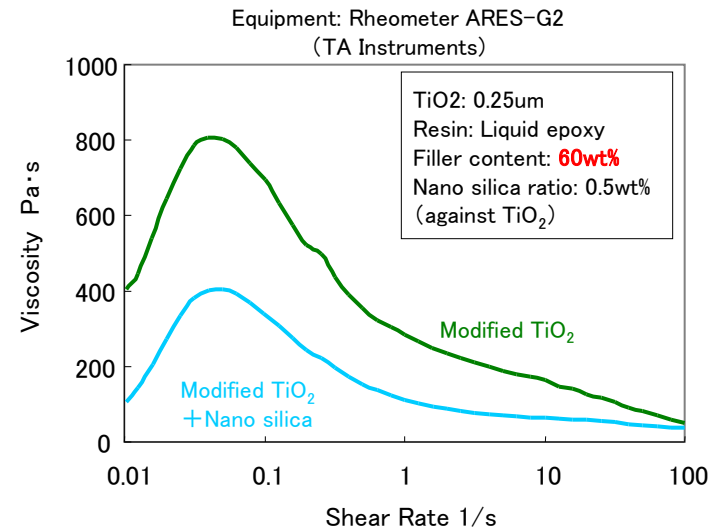
## Application for TiO<sub>2</sub>

### Rheology of resin compound



Nano silica can control the resin viscosity increase and improve the filler content.

### Application for modified TiO<sub>2</sub>



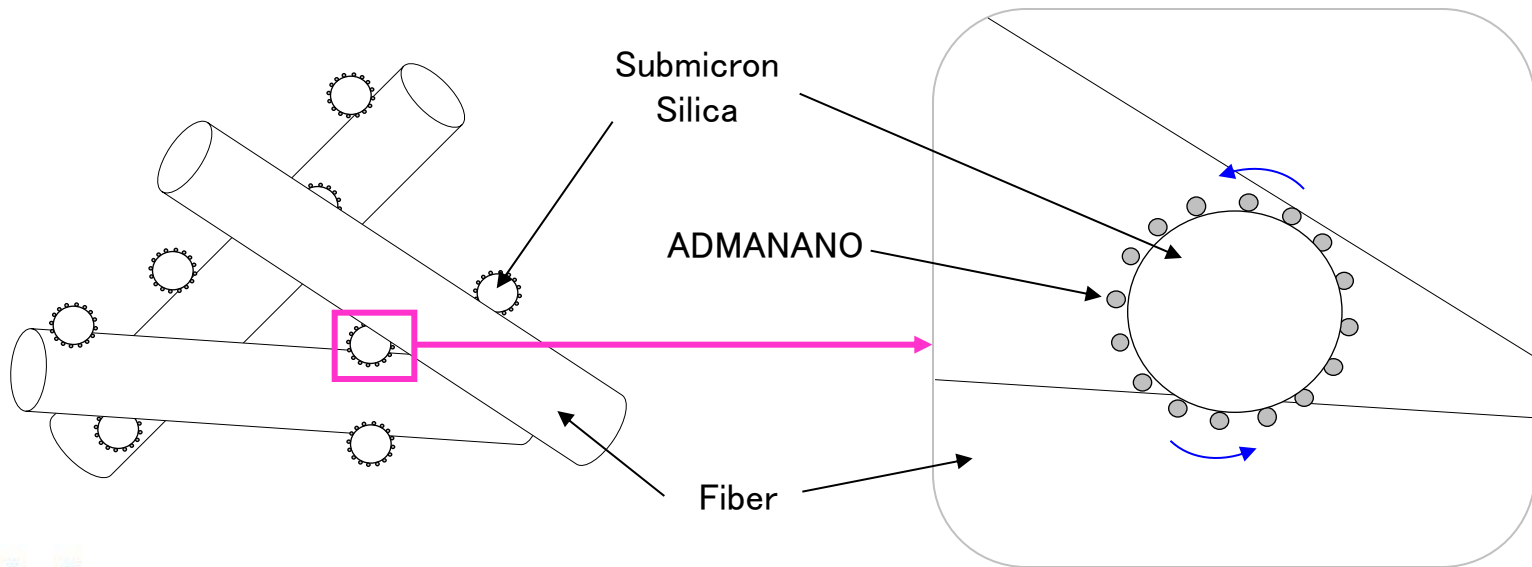
Nano silica can be applied to modified TiO<sub>2</sub>. Compound viscosity would be decrease.

## Effect of submicron silica with nano silica

Submicron Silica has an improvement in warpage, filler orientation and filler content of fiber.

Submicron Silica added ADMANANO has high flowability and easy to mix with fiber.

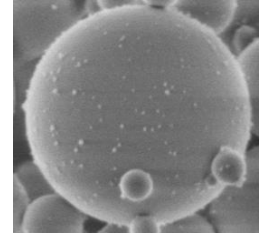
ADMANANO can control the viscosity increase in resin.



# Effect of submicron silica with nano silica for fiber

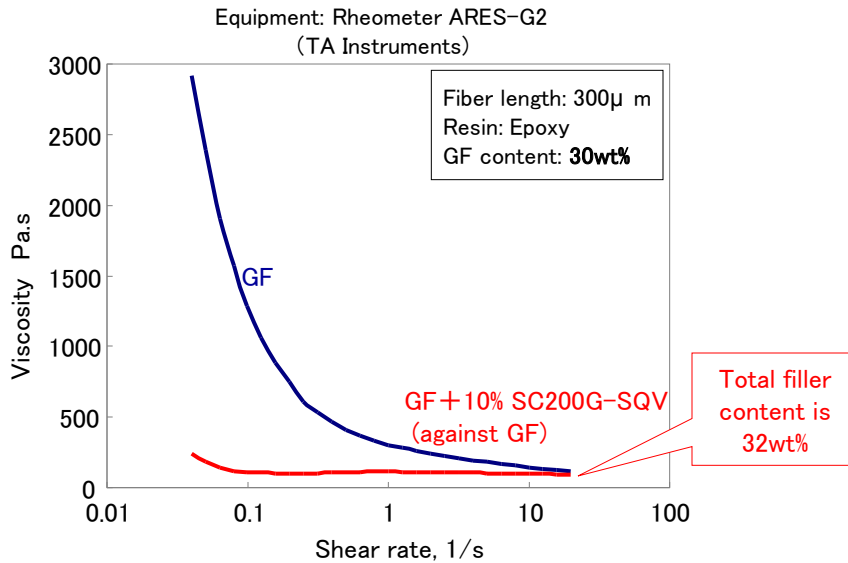
## Application for fiber

### ADMAFINE with Nano silica

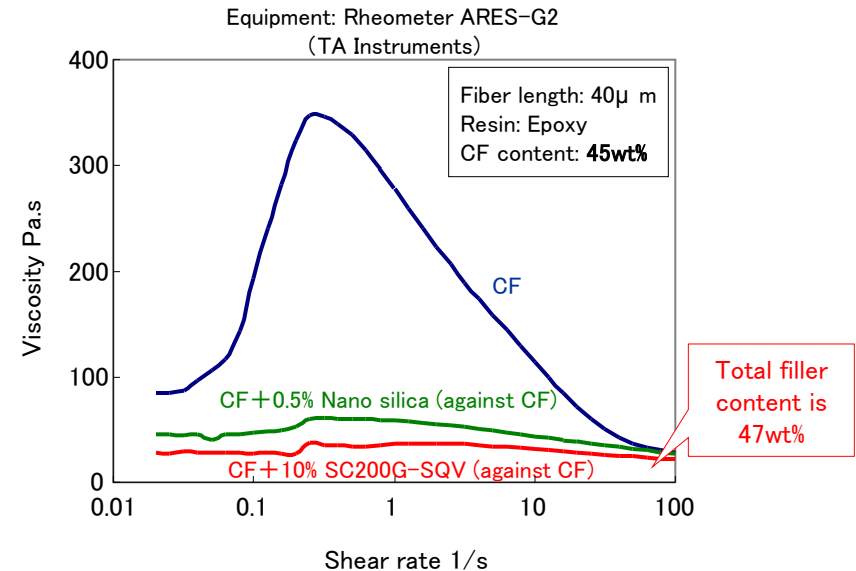


Product number :  
SC200G-SQV

### Resin rheology with GF



### Resin rheology with CF



Submicron Silica also can decrease viscosity of resin compound dramatically.  
High filler loading is possible and that delivers improvement of mechanical strength of resin compound.

## Product line for compounds

Product name	Product number	Form	D50	Surface treatment	Application
ADMANANO SILICA	YM010B-SP3	Powder	10nm	Phenyl silane	GF, CF, CB, PTFE, etc.
	YM010B-SM1	Powder	10nm	Methacryl silane	UV cure resin
ADMAFINE with ADMANANO	SC200G-SQV※	Powder	0.5μ m	SQ	GF, CF, etc.

※It is possible to use SC200G-SQV separately and the high formability like to be needed in optical components would be gained.