Polymers

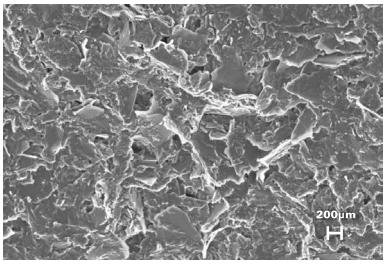
Engineering Materials

Refractories & Metallurgy

# WATER-BASED COLLOIDAL GRAPHITE DISPERSIONS

## TIMREX® C-SPERSE 2053

**Dispersion**



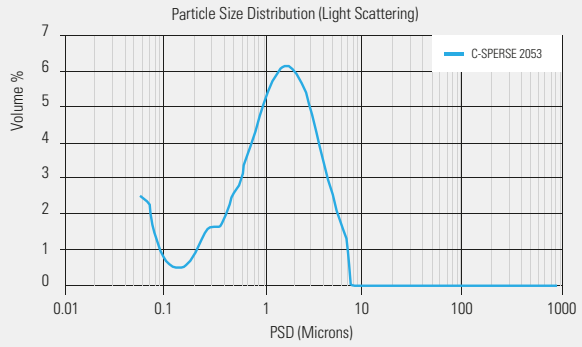

SEM Image of dried dispersion

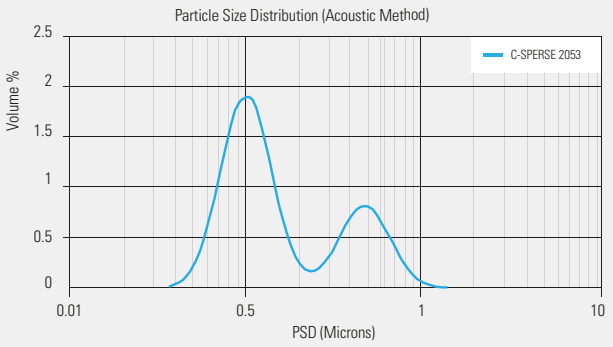
**C-SPERSE 2053** is a breakthrough dispersion that uniquely combines:

- Sub-micronic particle-size distribution (PSD)
- High-solid content
- Excellent stability

**C-SPERSE 2053 is one of the very few dispersions on the market with sub-micronic PSD**

| COLLOIDAL DISPERSION | PARTICLE SIZE DISTRIBUTION (Light Scattering) (microns) | | | PARTICLE SIZE DISTRIBUTION (Acoustic Method) (microns) | | |
|---|---|---|---|---|---|---|
| REFERENCE | d10 | d50 | d90 | d10 | d50 | d90 |
| C-SPERSE 2053 | 0.2 | 0.9 | 2.6 | 0.03 | 0.08 | 0.6 |

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INNOVATIONS TO POWER EVERYDAY LIFE

# Our Value Proposition

## HIGH SOLID CONTENT

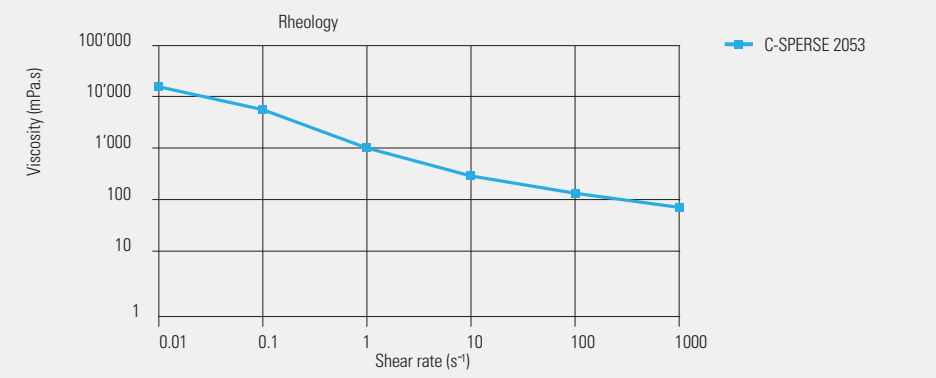
- Concentrated formula
- Cost savings

| COLLOIDAL DISPERSION | SOLID CONTENT | CARBON SOLID CONTENT |
|---|---|---|
| REFERENCE | (%) | (%) |
| C-SPERSE 2053 | 27 | 20 |

## LOW VISCOSITY

- Excellent stability
- Long shelf-life

### Rheometer measurements

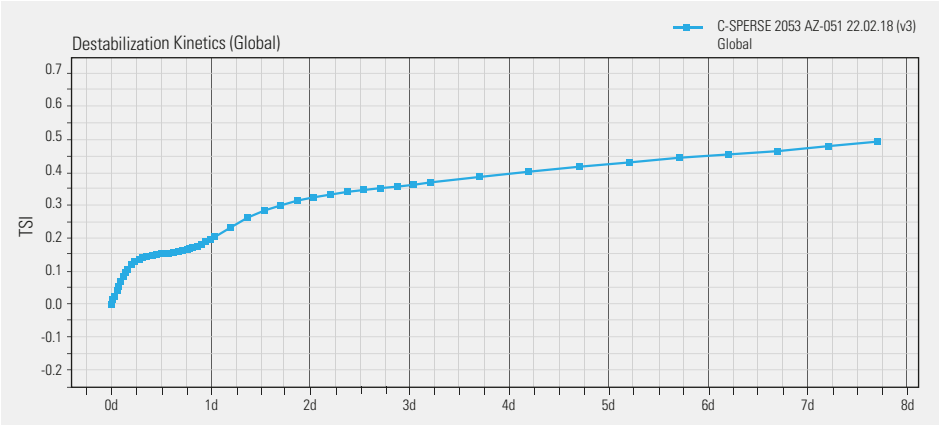



| COLLOIDAL DISPERSION | VISCOSITY (mPa.s) | | | | | |
|---|---|---|---|---|---|---|
| REFERENCE | 0.01s¹ | 0.1s¹ | 1s¹ | 10s¹ | 100s¹ | 1000s¹ |
| C-SPERSE 2053 | 21000 | 7000 | 1300 | 325 | 130 | 70 |

High stability of C-SPERSE 2053 is demonstrated in the following graphs.Test results producing a TSI of (0.5) at 7 days.

### Turbiscan stability index (TSI)

| COLLOIDAL DISPERSION | Turbiscan stability index (TSI) |
|---|---|
| REFERENCE | (7 days) |
| C-SPERSE 2053 | 0.5 |



# Potential Applications - Key Performance Requirements

## FORMULATION EXAMPLE

Concentrated dispersion could be used as part of a final recipe for:

| Electroconductive Finished Recipe | Total Amount 1.200 kg |
|---|---|
| **C-SPERSE 2053 dispersion** | 0.900 kg |
| **Styrene acrylic copolymer emulsion** | 0.120 kg |
| **Ratio of conductive material: binder** | 3:1 |
| **Application method** | Doctor Blade - 100 microns wet thickness coating |
| **Drying conditions** | 100 °C ; 1 h |

## ELECTRICAL CONDUCTIVITY

Good electrical conductivity makes C-SPERSE 2053 well suited for both anti-static and electro-conductive applications as demonstrated by the following data.

| PRODUCT | In Plane electrical conductivity (digital-ohmmeter measurement) | | Through Plane electrical conductivity (digital-ohmmeter measurement) |
|---|---|---|---|
| REFERENCE | Sheet resistance 100µm wet on Mylar foil (Ω•sq) | Electrical Vol. Resistivity 100µm wet Mylar foil (Ω•cm) | Electrical Vol. Resistivity 100µm wet on Aluminium foil (Ω•cm) |
| C-SPERSE 2053 | 40 | 0.07 | 4.6E4 |

## LUBRICITY

C-SPERSE is well suited for applications that require lubrication, especially at high temperatures, shown by a dynamic friction coefficient lower than 0.2.

| Reference | Dynamic friction coefficient (Internal Method) |
|---|---|
| **C-SPERSE 2053** | 0.13 |

## THERMAL CONDUCTIVITY

C-SPERSE can also be used in applications requiring thermal conductivity.

| Reference | THERMAL DIFFUSIVITY AT 25°C (mm ²/s) (laser flash method) |
|---|---|
| **C-SPERSE 2053** | 0.24 |

## POTENTIAL APPICATIONS

- Anti-static coatings
- Smart fabric and E-Textiles
- Conductive ink
- Hot metal forming
- Forging and extrusion lubricant
- Release agent for dies and die casting
- Moulds
- Tools

IMERYS
Graphite & Carbon

## EUROPE, AFRICA, MIDDLE EAST, INDIA

Imerys Graphite & Carbon Switzerland Ltd.
"Il Centro" Via Cantonale 65, CH-6804 Bironico, Switzerland
Tel: +41 91 873 20 10, Fax: +41 91 873 20 19
graphiteandcarbon.ch@imerys.com

## AMERICAS

Imerys Graphite & Carbon Canada Inc.
990 Rue Fernand-Poitras, Terrebonne, QC, J6Y 1V1, Canada
Tel: +1 450 622 91 91, Fax: +1 450 622 86 92
graphiteandcarbon.ca@imerys.com

## CHINA

Imerys Graphite & Carbon
1438 Hong Qiao Road, Chang Ning District 6F,
Gubei International Fortune Centre II, CN-201103 Shanghai, China
Tel: + 86 21 2223 0136, Fax: + 86 21 2223 0199
graphiteandcarbon.cn@imerys.com

## SOUTH KOREA

Imerys Graphite & Carbon South Korea
7F, Gyodae Venture Tower, 64, Saimdang-ro, Seocho-gu, KR-06640 Seoul, Korea
Tel: +82 234 88 30 30, Fax: +82 234 88 30 79
graphiteandcarbon.kr@imerys.com

## JAPAN & SOUTH EAST ASIA

Imerys Graphite & Carbon Japan K.K.
13F Setagaya Business Square tower 4-10-1 Yoga, Setagaya-ku, JP-158-0097 Tokyo, Japan
Tel: +81 3 4570 5410
graphiteandcarbon.jp@imerys.com


imerys-graphite-and-carbon.com