



## Technical Data Sheet (TDS)

**Product Name:** XT 40% Silver on Vulcan XC-72R Grade R

**Fuel Cell Store SKU Numbers:** 11080059, 11080060, 11080061

**Form:** Fine powder

**Application:** Catalyst for electrochemical applications and other R&D use cases

### 1. General Information

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Parameter	Specification
Appearance	Fine, porous black powder
Composition (wt%)	~ 40 wt% Ag, ~60 wt% Carbon support
Support	Vulcan XC-72R carbon black
Molecular Formula	Not applicable (heterogeneous composite)
Metal Purity	≥ 99.9 % (Ag metal basis)
Storage	Store in a tightly sealed, antistatic container under dry conditions at room temperature.

### 2. Physical Properties

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Property	Value
Particle Morphology	Nanocrystalline Ag clusters uniformly dispersed on high-surface-area carbon
Average Particle Size	32.6 $\mu\text{m}$ ( $D_{50}$ , Laser Diffraction)
Particle Size Range	$\mu\text{m}$ ( $D_{10}$ – $D_{90}$ )
BET Surface Area	In the range of 94 - 124 $\text{m}^2/\text{g}$
Bulk Density(loose Powder)	~0.20 - 0.32 $\text{g}/\text{cm}^3$
Color	Black

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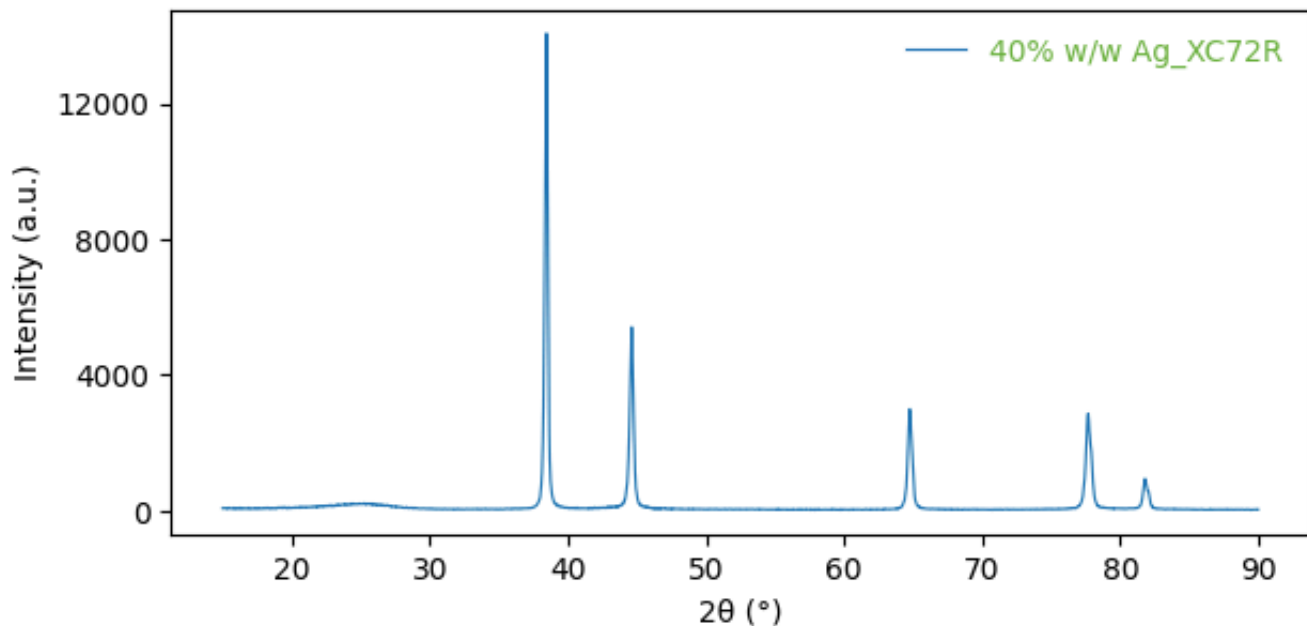
### 3. Structural Characterization (X-ray Diffraction)

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**Phase Identified:**

- **Structure** : Face-centered cubic (fcc) Silver (0)
  - **Database Reference:** COD Card No. (9011607); JCPDS No. (04-0783)
  - **Space Group** : *Fm-3m*
  - **Secondary Phases** : None detected
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- **Instrument:** Rigaku MiniFlex 300/600
- **Cu-K $\alpha$  radiation** ( $\lambda = 1.5406 \text{ \AA}$  | **scan rate:** 0.5°/min | **step size:** 0.02°(2 $\theta$ ),
- **2 $\theta$  range:** 10–90° | **optics:** Monochromator





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### Selected Diffraction Peaks:

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hkl Plane	2 $\theta$ (°)	d-spacing (Å)	FWHM (°)	Crystallite Size (nm)	Relative Intensity (%)
(111)	38.45	2.339	0.23	39.2	100.0
(200)	44.61	2.029	0.28	32.4	49.18
(220)	64.75	1.438	0.28	34.9	30.28

### Lattice Parameters:

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Parameter	Value (Å/°)
a = b=c	4.063 Å
$\alpha, \beta, \gamma$	90°

### Bond Distances:

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- Ag-Ag nearest-neighbor distance: 2.8735 Å
- Consistent with FCC 12-fold cubic coordination.

## 4. Surface Area Analysis (BET)

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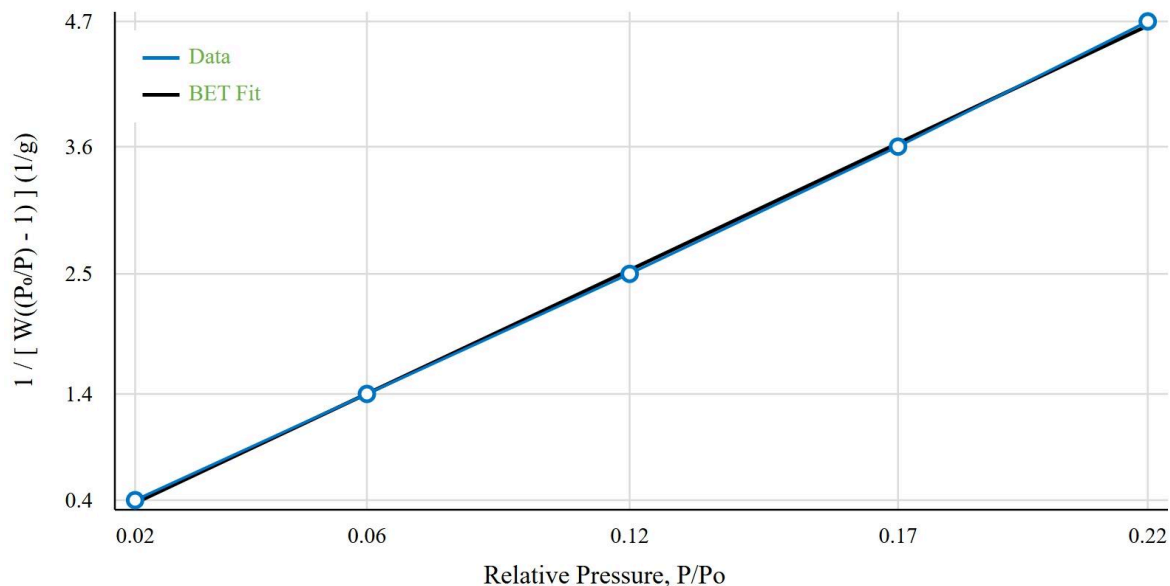
Instrument: Anton Paar QuantaChrome NOVA

Adsorption gas: N<sub>2</sub>, Bath temperature: 77.3 K

- Degassing Conditions: 4 hrs, 100°C  
Sample Weight: 0.2995 g  
Sample Volume: 0.07679 cc  
Equilibration Time: 60 sec (adsorption/desorption)  
Relative Pressure Range (P/P<sub>0</sub>): ~0.018 – 0.22  
Analysis Time: 73.7 minutes



Multi-Point BET Plot



### BET Results Summary:

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**BET surface area** for this particular production batch: **109.316 m<sup>2</sup>/g**,

**C constant:** 585.132,

**slope:** 31.803 (1/g),

**intercept:** 0.054 (1/g),

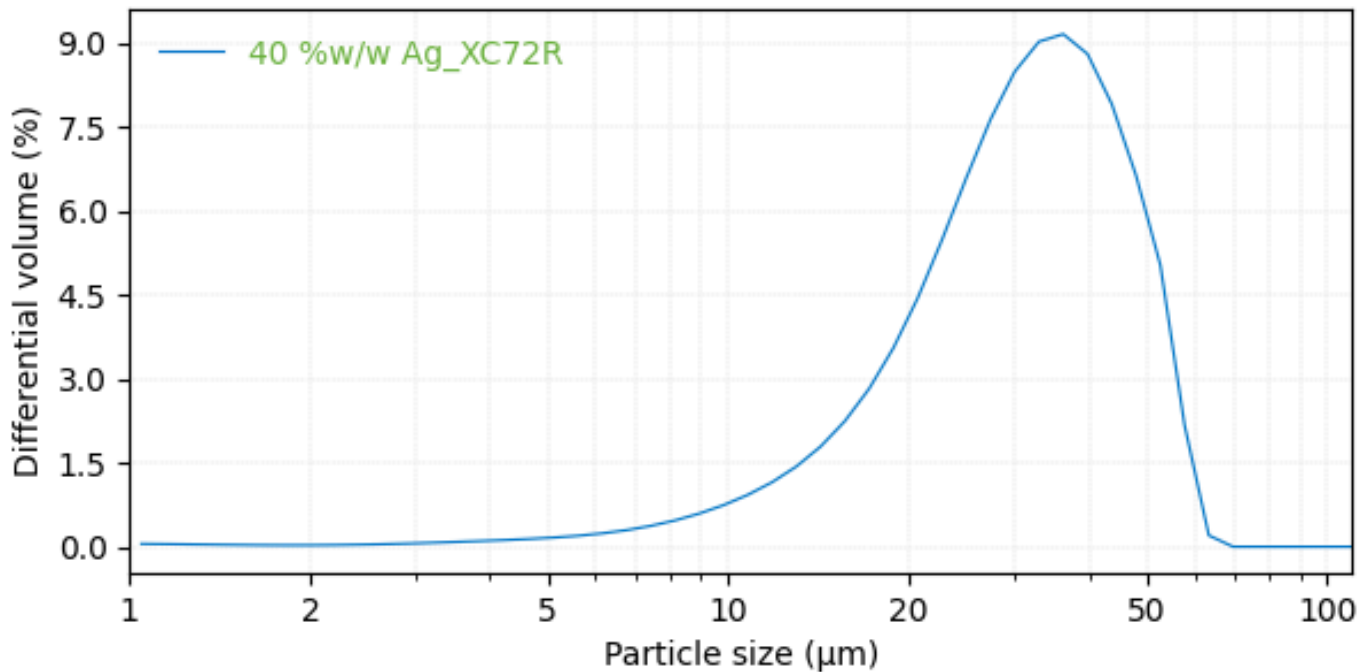
**correlation coefficient (r<sup>2</sup>):** 0.9999

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## 5. Particle Size Distribution (Laser Diffraction):

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**Instrument:** Beckman Coulter LS 13 320 | **Fluid:** Water  
**Measurement Type:** Average of 3 runs



### Percentile Values:

- D<sub>10</sub>: 15.77 μm
  - D<sub>25</sub>: 23.58 μm
  - D<sub>50</sub>: (Median): 32.63 μm
  - D<sub>75</sub>: 42.31 μm
  - D<sub>90</sub>: 50.78 μm
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## 6. Handling and Safety

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- **PPE:** nitrile gloves, P-100/N95 dust mask, safety goggles.
- **Exposure:** avoid inhalation or skin/eye contact.
- **Ventilation:** Work in a fume hood or well-ventilated area to limit airborne dust.
- **Combustion risk:** carbon support is combustible; silver nanoparticles can catalyse oxidation. Keep away from strong oxidisers, sparks, and open flames.
- **Disposal:** follow local regulations; recycle the silver content whenever feasible.