CATALYST

Technical Data Sheet (TDS)

Product Name: XT Ruthenium Oxide Grade S
Fuel Cell Store SKU Number: 11080020, 11080021, and 11080022
Form: Fine powder
Application: Electrocatalyst for electrochemical device applications

1. General Information

Parameter	Specification
Appearance	Dark grey to black powder
Molecular Formula	RuO_2
Molecular Weight	133.07 g/mol
Purity	> 99.9%
Storage	Store in an airtight container at room temperature in dry conditions

2. Physical Properties

Property	Value
Particle Morphology	Irregular/rough-surfaced grains
Average Particle Size	28 μm (D_{50}, Laser Diffraction)
Particle Size Range	μm (D_{10} – D_{90})
BET Surface Area	140-160 m^2/g
Bulk Density	~1.4 g/cm^3
Color	Black

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Bryan, Texas, 77807, USA
Phone: + 1-979-703-1925
Email: sales@fuelcellsetc.com

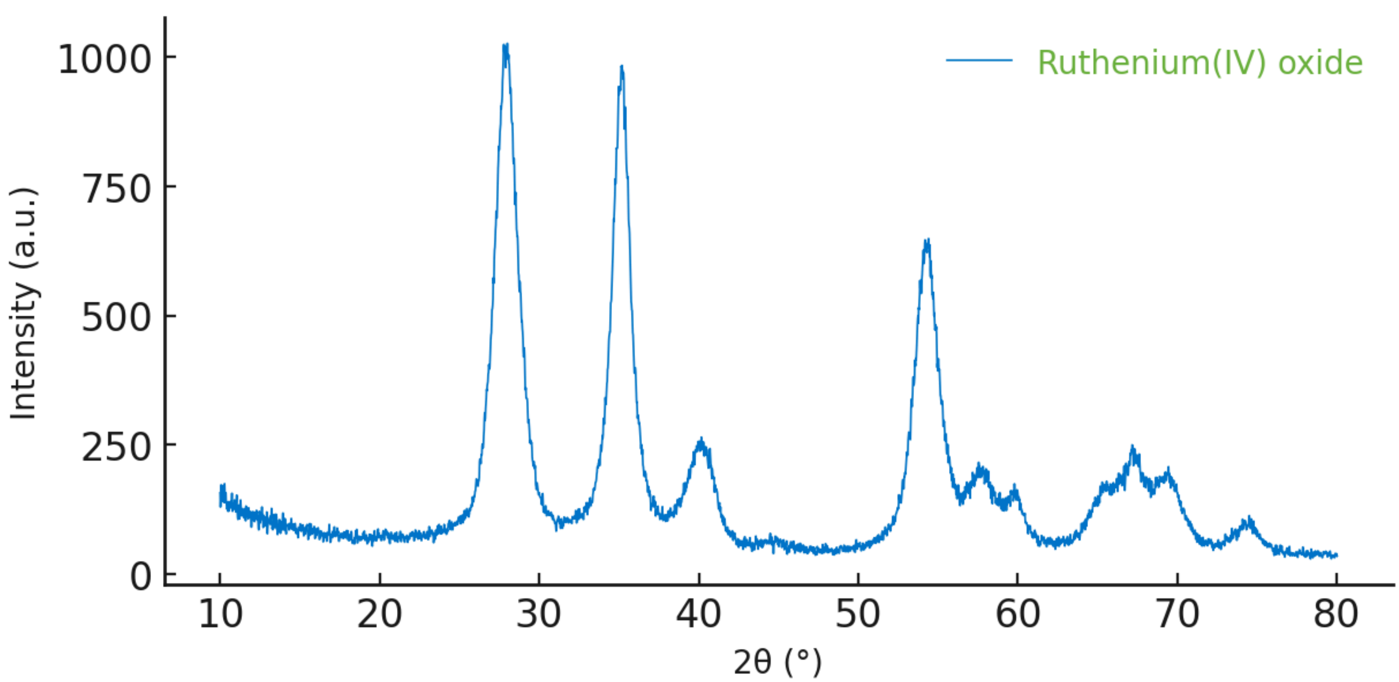
3. Structural Characterization (X-ray Diffraction)

Phase Identified:

- **Phase:** Rutile-phase RuO_2
- **Database Reference:** COD Card No. (1538150); JCPDS No. (40-1290)
- **Space Group:** $P4_2/mnm$
- **Secondary Phases:** None detected

- **Instrument:** Rigaku MiniFlex 300/600
- **Cu-Kα radiation** (λ = 1.5406 Å **|** **scan rate:** 0.5°/min **|** **step size:** 0.02°(2θ),
- **2θ range:** 10–80° **|** **optics:** Monochromator

FUEL CELLS ETC
COMMERCIAL FUEL CELL COMPONENTS



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Selected Diffraction Peaks:

hkl Plane	2θ (°)	d-spacing (Å)	FWHM (°)	Crystallite Size (nm)	Relative Intensity (%)
(110)	27.91	3.194	1.591	5.37	100.0
(101)	35.18	2.548	1.229	7.08	75.09
(200)	39.88	2.25	1.713	5.16	20
(211)	54.22	1.690	1.527	5.01	58.51
(002)	59.86	1.543	4.36	3.16	7.3

Lattice Parameters:

Parameter	Value (Å/°)
a = b	4.5165 Å
c	3.0874 Å
α, β, γ	90°

Bond Distances:

- Ru–O distances range: **1.963 Å – 1.980 Å**
- Consistent with typical distorted octahedral coordination.

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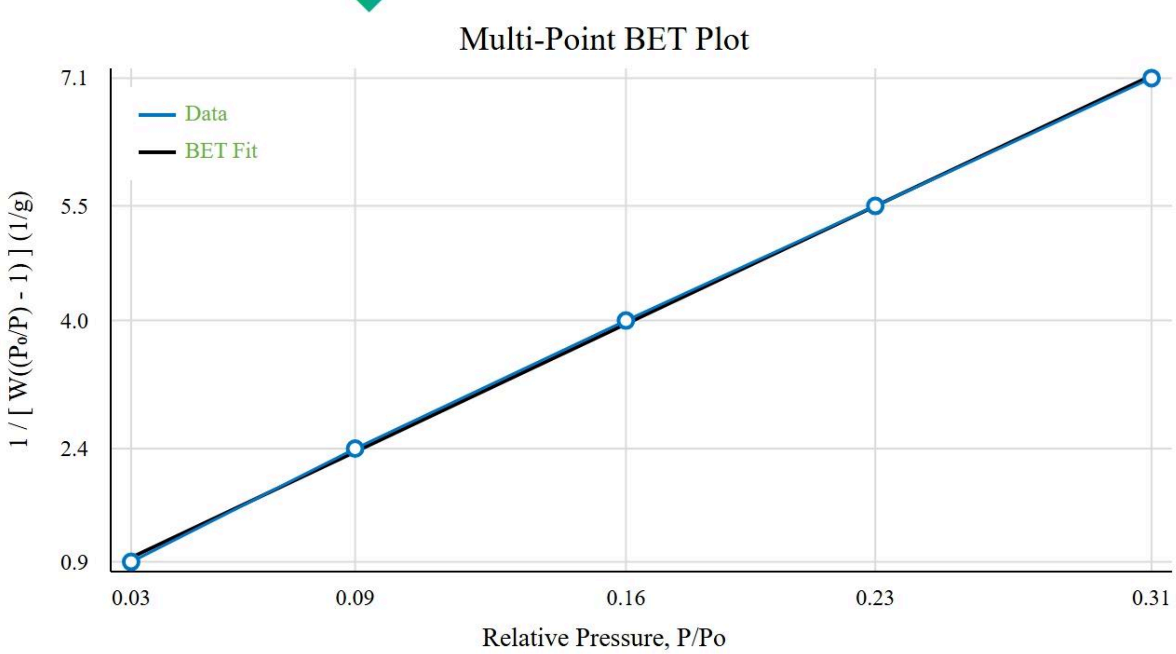
4. Surface Area Analysis (BET)

Instrument: Anton Paar QuantaChrome NOVA

Adsorption gas: N_2, Bath temperature: 77.3 K

- Degassing Conditions: **4 hrs, 100°C**
  Sample Weight: **0.290 g**
  Sample Volume: **0.0743 cc**
  Equilibration Time: **60 sec (adsorption/desorption)**
  Relative Pressure Range (P/Po): **~0.02 – 0.3**
  Analysis Time: **98.7 minutes**



BET Results Summary:

BET surface area for this particular production batch: **152.45 m²/g,**
C constant: **87.651**,
slope: **22.583** (1/g),
intercept: **0.2606** (1/g),
correlation coefficient (r^2): **0.999**.

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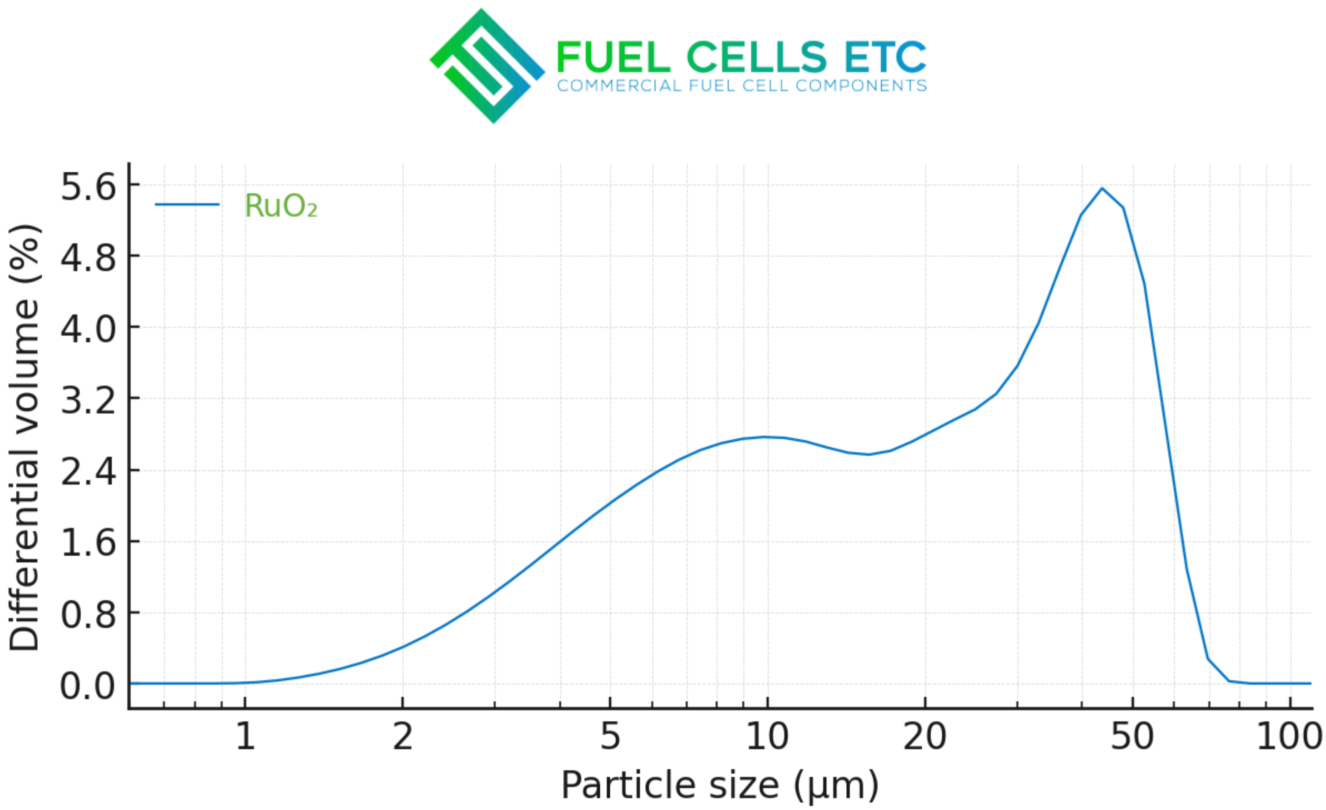
5. Particle Size Distribution (Laser Diffraction):

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



Percentile Values:

- D_{10}: **4.65 µm**
- D_{25}: **8.53 µm**
- D_{50}: **(Median): 20.36 µm**
- D_{75}: **39.85 µm**
- D_{90}**: 51.7 µm**

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6. Handling and Safety

- Use appropriate PPE: gloves, dust mask, goggles
- Avoid inhalation or contact with skin and eyes
- Dispose of material according to local regulations

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