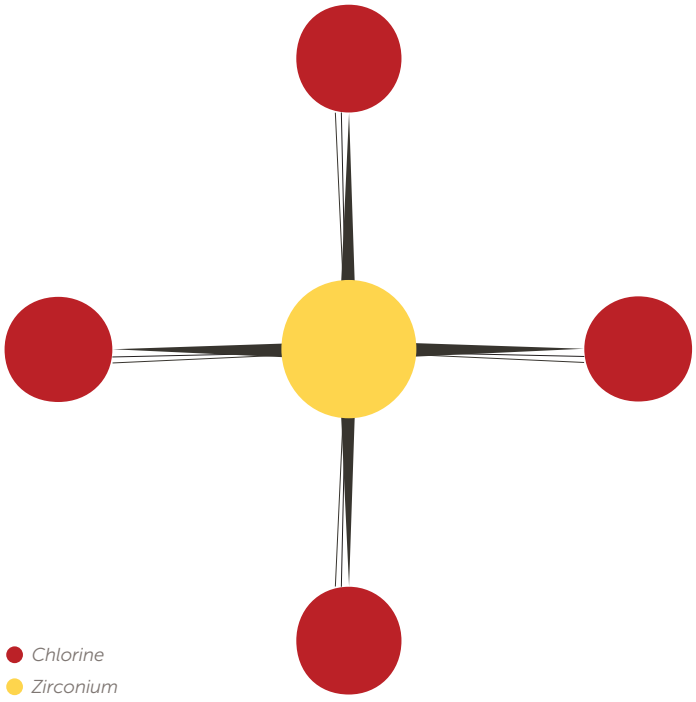
UltraPur™ $ZrCl_4$

Zirconium Tetrachloride



Zirconium tetrachloride is a solid metallic halide used in the semiconductor industry as a precursor for the formation of the high-κ dielectric material Zirconium Oxide ZrO_2. There is significant usage of ZrO_2 layers in memory metal-insulator-metal (MIM) capacitor structures and logic high-κ metal gate (HKMG) transistors. For the deposition process, Atomic Layer Deposition (ALD) is the method typically employed. In the ALD process, $ZrCl_4$ provides the source of Zr and a second precursor such as water or ozone as the source of oxygen.

Delivery System

Entegris recommends its proprietary ProE-VAP® solid precursor delivery system for optimum flux and utilization of $ZrCl_4$. This is an innovative designed ampoule that maximizes solid precursor exposed area and provides uniform heating to generate adequate mass flux. Details of the ProE-VAP delivery system can be found on our separate data sheet. Please ask your Entegris representative.

FEATURES & BENEFITS

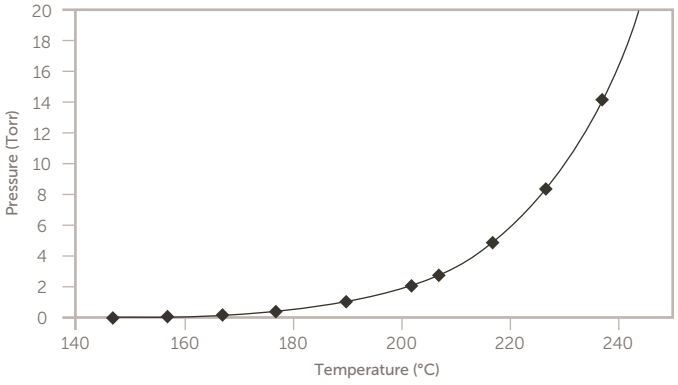
- Semiconductor grade purity
- Optimized ProE-VAP delivery system for solid precursor delivery

APPLICATIONS

- ALD Precursor for ZrO_2 high-κ layer deposition for capacitor structures

PERFORMANCE DATA

Vapor Pressure Curve



SPECIFICATIONS

Physical properties

Chemical formula	$ZrCl_4$
Form	White powder
Molecular weight	233.04
Density	2.8 g/cm³
Melting point	437°C (818.6°F)

Purity analysis

Element	Specification	Analytical method
Aluminum	50.000 ppm	ICP-MS
Antimony	1.000 ppm	ICP-MS
Arsenic	3.000 ppm	ICP-MS
Calcium	3.500 ppm	ICP-MS
Chromium	2.000 ppm	ICP-MS
Copper	1.000 ppm	ICP-MS
Gallium	1.000 ppm	ICP-MS
Hafnium	45.000 ppm	ICP-MS
Iron	5.000 ppm	ICP-MS
Lead	1.000 ppm	ICP-MS
Magnesium	1.000 ppm	ICP-MS
Manganese	1.000 ppm	ICP-MS
Nickel	1.000 ppm	ICP-MS
Potassium	1.500 ppm	ICP-MS
Sodium	14.000 ppm	ICP-MS
Tin	1.000 ppm	ICP-MS
Titanium	3.000 ppm	ICP-MS
Uranium	3.000 ppm	ICP-MS
Zinc	4.000 ppm	ICP-MS

Parameter	Specification	Analytical Method
Purity	99.98%	ICP-MS

FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit **entegris.com** and select the Contact Us link to find the customer service center nearest you.

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Entegris
PURE ADVANTAGE

Corporate Headquarters
129 Concord Road
Billerica, MA 01821
USA

Customer Service
Tel +1 952 556 4181
Fax +1 952 556 8022
Toll Free 800 394 4083