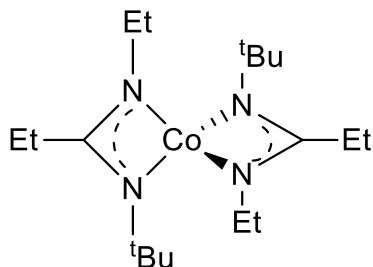


Catalog # 27-0469 Bis(N-t-butyl-N"-ethylpropanimidamido)cobalt(II), min. 98% (99.99%-Co) PURATREM



Thermal Behavior:

- Vapor pressure: 0.06 Torr at 50 °C [1], 0.26 Torr at 85 °C [2]
- TGA available in [1]
- Melting point: -17 °C [1, 2]

Technical Notes:

1. Liquid cobalt amidinate for ALD and CVD of cobalt metal and composite thin films.

Target Deposit	Deposition Technique	Delivery Temperature	Pressure	Co-reactants	Deposition Temperature	Ref.
Co	ALD	80 °C	0.26 Torr	H ₂	265 °C	[3, 4]
CoW _x	ALD	90 °C	0.3 Torr	W(N ^t Bu) ₂ (NMe ₂) ₂ , NH ₃	375 °C	[5]
CoW _x	CVD	90 °C	3 Torr	W(N ^t Bu) ₂ (NMe ₂) ₂ , NH ₃	375 °C	[5]
CoO	ALD	80 °C		H ₂ O	180 °C	[8]
CoN _x	CVD	70-85 °C	1-5 Torr	NH ₃ , H ₂	100-200 °C	[2, 6]
Co:TiN	ALD	75 °C		Ti(NMe ₂) ₄ , NH ₃	200 °C	[7]

References:

1. *Dalton Trans.*, **2008**, 2592.
2. *ECS J. Solid State Sci. Technol.* **2012**, 1, N79.
3. *Chem. Mater.* **2014**, 26, 2642.
4. *J. Phys. Chem. Lett.* **2014**, 5, 1091.
5. *J. Mater. Chem. C*, **2015**, 3, 2500.
6. *ECS J. Solid State Sci. Technol.* **2017**, 6, P345.
7. *J. Alloys Compd.* **2018**, 737, 684.
8. *J. Vac. Sci. Technol. A*, **2019**, 37, 010903.

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<p>64-3575</p>	<p>26-0145</p>	<p>57-1200</p>	<p>57-1500</p>
<p>03-8000</p>	<p>71-1050</p>	<p>12-0865</p>	<p>12-0845</p>
<p>25-0230</p>	<p>28-0045</p>	<p>44-0056</p>	<p>21-1200</p>
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20-8200	Bis(N,N'-diisopropylformamidinato)calcium(II) dimer, (99.99 %-Ca) PURATREM (1959584-78-1)	1g 5g
	C ₂₈ H ₆₀ Ca ₂ N ₈ ; FW: 588.99; tan to light-brown pwdr. <i>air sensitive, moisture sensitive</i>	
Technical Note:		
1. Calcium amidinate precursor for the atomic layer deposition (ALD) of calcium containing thin films.		
References:		
1. <i>Angew. Chem. Int. Ed.</i> , 2016 , 55, 10228 –10233.		
27-0468	Bis(N-t-butyl-N'-ethylpropanimidamido)cobalt(II), min. 98% (1011477-51-2)	1g 5g
	C ₁₈ H ₃₈ CoN ₄ ; FW: 369.45; blue-green liq. <i>air sensitive, moisture sensitive</i>	
Technical Note:		
1. Volatile cobalt complex for the atomic layer deposition of cobalt metal.		
References:		
1. <i>Chemistry of Materials</i> , 2014 , 26, 2642		
2. <i>J. Phys. Chem. Lett.</i> , 2014 , 5, 1091		
3. <i>Dalton T.</i> , 2008 , 19, 2592		
27-0469	Bis(N-t-butyl-N'-ethylpropanimidamido)cobalt(II), min. 98% (99.99%-Co) PURATREM (1011477-51-2)	1g 5g
	C ₁₈ H ₃₈ CoN ₄ ; FW: 369.45; blue-green liq. <i>air sensitive, moisture sensitive</i>	
Technical Note:		
1. Volatile Cobalt precursor for ALD/CVD		
References:		
1. <i>J. Phys. Chem. Lett.</i> , 2014 , 5, 1091		
2. <i>Chem. Mater.</i> , 2014 , 26, 2642		
3. <i>J. Mater. Chem. C.</i> , 2015 , 3, 2500		
27-0485	Bis(N,N'-di-i-propylacetamidinato)cobalt(II), min. 98% Co(iPr-MeAMD)₂ (635680-58-9)	250mg
amp	C ₁₆ H ₃₄ CoN ₄ ; FW: 341.40; green xtl.; m.p. 84°; b.p. sublimes 50°C (50 mTorr) <i>air sensitive, moisture sensitive</i>	1g 5g
Technical Notes:		
1. Precursor with metal nitrogen bonds used for the atomic layer deposition of metals, nitrides, and oxides. See WO 2004/046417A2.		
2. Copper complex used in the vapor phase, atomic layer deposition of Co ₉ S ₈ and its application for super conductors.		
3. Complex used in the atomic layer deposition of cobalt sulfide.		
References:		
1. <i>Nano Letters</i> , 2015 , 15, 6689		
2. <i>ACS Nano</i> , 2015 , 9, 8484		
27-0486	Bis(N,N'-di-i-propylacetamidinato)cobalt(II), min. 98% (99.99%-Co) PURATREM (Co(iPr-MeAMD)₂ (635680-58-9)	250mg
amp	C ₁₆ H ₃₄ CoN ₄ ; FW: 341.40; green xtl.; m.p. 84°; b.p. sublimes 50°C (50 mTorr)	1g
HAZ	<i>air sensitive, moisture sensitive</i>	5g
Technical Note:		
1. See 27-0485 (page 2)		
29-7100	Bis(N,N'-di-sec-butylacetamidinato)dicropper(I), 99% (695188-31-9)	250mg
amp	(C ₁₀ H ₂₁ N ₂) ₂ Cu ₂ ; FW: 465.67; white to off-white xtl. <i>air sensitive, moisture sensitive, (store cold)</i>	1g 5g
Technical Note:		
1. Precursor with metal nitrogen bonds used for the atomic layer deposition of metals, metal nitrides, and oxides. See WO 2004/046417A2.		
References:		
1. <i>Chem. Mater.</i> , 2011 , 23, 4411		
2. <i>J. Am. Chem. Soc.</i> , 2009 , 131, 18159		
3. <i>Appl. Phys. Lett.</i> , 2009 , 94, 123107		
4. <i>Inorg. Chem.</i> , 2005 , 44, 1728		
64-3575	Tris(N,N'-di-i-propylformamidinato)gadolinium(III), (99.999+%-Gd) PURATREM Gd-FMD	1g 5g
NEW	C ₂₁ H ₄₅ GdN ₆ ; FW: 538.87; white to off-white pwdr. <i>air sensitive, moisture sensitive</i>	

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26-0145	Bis(N,N'-di-t-butylacetamidinato)iron (II), min. 98% (635680-56-7)	250mg
amp	C ₂₀ H ₄₂ N ₄ Fe; FW: 394.42; dark gray solid; m.p. 107° <i>air sensitive, moisture sensitive</i>	1g 5g
Note: Extremely air-sensitive. Contact Strem to discuss.		
Technical Notes:		
1. Iron amidinate used in the chemical vapor deposition of iron, iron carbides and iron nitride films.		
2. Precursor for the MOCVD of iron-containing thin films.		
3. Fabrication of thin films of iron oxide via atomic layer deposition.		
References:		
1. <i>Journal of the Electrochemical Society</i> , 2010 , 157, D454		
2. <i>ECS Transactions</i> , 2009 , 25, 181		
3. <i>ACS Appl. Mater. Interfaces</i> 2015 , 7, 16138		
57-1200	Tris(N,N'-di-i-propylformamidinato)lanthanum(III), (99.999+%-La) PURATREM La-FMD (1034537-36-4)	1g
amp	C ₂₁ H ₄₅ LaN ₆ ; FW: 520.53; white to off-white powdr.	5g
HAZ	<i>air sensitive, moisture sensitive</i>	
Technical Note:		
1. Lanthanum precursor for the ALD/CVD of La ₂ O ₃ , LaLuO ₃ , LaScO ₃ , and LaYO ₃ thin films.		
References:		
1. <i>Appl. Phys. Lett.</i> , 2009 , 94, 262904		
2. <i>Electrochem. Solid-State Lett.</i> , 2009 , 12, G13		
3. <i>Appl. Phys. Lett.</i> , 2010 , 97, 162910		
4. <i>J. Electrochem. Soc.</i> , 2011 , 158, H447		
5. <i>ECS Trans.</i> , 2012 , 45, 95		
6. <i>Nano Lett.</i> , 2013 , 13, 594		
7. <i>J. Crystal Growth</i> , 2013 , 363, 150		
8. <i>ECS Trans.</i> , 2013 , 54, 255		
9. <i>App. Surface Sci.</i> , 2014 , 292, 880		
10. <i>Proc. SPIE</i> , 2014 , 8987, 898712		
57-1500	Tris(N,N'-di-i-propylpentylamidinato)lanthanum(III), 98% (99.999%-La) PURATREM	1g
amp	C ₃₃ H ₆₉ N ₆ La; FW: 688.84; off white to beige solid <i>air sensitive, moisture sensitive</i>	5g
03-8000	(N,N'-Di-i-propylacetamidinato)lithium, min. 97% (99.99+%-Li) PURATREM	1g
	C ₈ H ₁₇ N ₂ Li; FW: 148.17; off white to beige solid <i>air sensitive, moisture sensitive</i>	5g
71-1050	Tris(N,N'-di-i-propylacetamidinato)lutetium(III), 99%	250mg
amp	Lu(C ₈ H ₁₇ N ₂) ₃ ; FW: 598.67; white to off-white powdr. <i>air sensitive, moisture sensitive</i>	1g 5g
12-0865	Bis(N-t-butyl-N'-ethylpropanimidamidato)magnesium, min. 98% (99.99+%-Li) PURATREM	1g
amp	C ₁₈ H ₃₈ MgN ₄ ; FW: 334.82; off-white to tan solid <i>air sensitive, moisture sensitive</i>	5g
12-0845	Bis(N,N'-di-sec-butylacetamidinato)magnesium, 99%	1g
	C ₂₀ H ₄₂ MgN ₄ ; FW: 362.88; colorless to pale yellow liq. <i>moisture sensitive</i>	5g
25-0230	Bis(N,N'-di-i-propylpentylamidinato)manganese(II), min. 98% (1188406-04-3)	250mg
amp	C ₂₂ H ₄₆ MnN ₄ ; FW: 421.57; brown solid <i>air sensitive, moisture sensitive</i>	1g 5g
References:		
1. <i>J. Phys. Chem. C</i> , 2012 , 116, 23585		
28-0045	Bis(N,N'-di-t-butylacetamidinato)nickel(II), (99.999%-Ni) PURATREM (940895-79-4)	250mg
amp	C ₂₀ H ₄₂ N ₄ Ni; FW: 397.27; dark, purple-black xtl.; m.p. 95-96° <i>air sensitive, moisture sensitive</i>	1g 5g
Technical Notes:		
1. CVD/ALD precursor for the preparation of nickel nitride (NiNx) films.		
2. CVD/ALD precursor for the preparation of nickel sulfide (NiSx) films co-deposited by H ₂ S.		
References:		
1. <i>Chem. Mater.</i> , 2010 , 22, 3060		
2. <i>Chem. Mater.</i> , 2016 , 28, 1155.		

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44-0056	Bis(N,N'-di-tert-butylacetamidinato)ruthenium(II) dicarbonyl, 98% (99.99%-Ru) PURATREM (949113-49-9)	1g
amp	C ₂₂ H ₄₂ N ₄ O ₂ Ru; FW: 495.67; Beige to yellow solid; m.p. 204 <i>air sensitive, moisture sensitive</i>	5g
21-1200	Tris(N,N'-di-i-propylformamidinato)scandium(III), (99.9%-Sc)	1g
	C ₂₁ H ₄₅ ScN ₆ ; FW: 426.58; white to off-white powdr. <i>air sensitive, moisture sensitive</i>	5g
50-1170	Bis(N,N'-di-i-propylacetamidinato)tin(II), 99% (1421599-46-3)	250mg
amp	Sn(C ₈ H ₁₇ N ₂) ₂ ; FW: 401.18; white xtls. <i>air sensitive, moisture sensitive</i>	1g 5g

References:

1. *Chem. Mater.*, **2014**, 26, 3065.
2. *Adv. Eng. Mater.*, **2011**, 1, 1116

70-1000	Tris(N,N'-di-i-propylacetamidinato)ytterbium(III), 99%	250mg
	Yb(C ₈ H ₁₇ N ₂) ₃ ; FW: 596.74; white to off-white powdr. <i>air sensitive, moisture sensitive</i> Note: ALD precursor.	1g 5g
39-1550	Tris(N,N'-di-i-propylformamidinato)yttrium(III), 97%	1g
amp	C ₂₁ H ₄₅ N ₆ Y; FW: 470.53; light beige-yellow solid <i>air sensitive, moisture sensitive</i>	5g

Additional Product Details

Metal amidinate complexes, with intriguing structural diversity and novel properties, have been the subject of intense investigations in chemistry, electronics, optics, energy, and materials science.^[1-4] Great interest has been focused on the applicability of the complexes as single-source precursors of advanced functional materials,^[5] Metal-based amidinate complexes have been used as volatile precursors for Atomic Layer Deposition of films with novel versatile properties. This allows a wide variety of applications in modern high technology, including semiconductor micro-electronics, high-resolution displays, optical filters, magnetic information storage, and catalysis.^[10-12] The precursors need to be designed in such a way that the compounds are volatile and thermally stable at growth temperatures.^[10,13] Generally, more volatility directly correlates with a better precursor. The synthesis and characterization of numerous metal compounds with amidinate ligands have been reported in the literature.^[10,12-14] The volatility and thermal stability of symmetric amidinates of transition metals and lanthanum with oxidation states of one (Cu, Ag, Au),^[15] two (Mg, Mn, Fe, Co, Ni),^[16] three (Ti, V, Y, Al, Ga, La),^[17] and four (Ru, Hf)^[8] have been reported.

References

1. A. R. Sadique, M. J. Heeg, C. H. Winter, *J. Am. Chem. Soc.* **2003**, 125, 7774-7775.
2. J. R. Hagadorn, J. Arnold, *Angew. Chem. Int. Ed.* **1998**, 37,1729-1731; *Angew. Chem.* **1998**, 110, 1813-1815.
3. H. Kondo, K. Matsubara, H. Nagashima, *J. Am. Chem. Soc.* **2002**, 124, 534-535.
4. X. Jiang, J. C. Bollinger, M. H. Baik, D. Lee, *Chem. Commun.* **2005**, 8, 1043-1045.
5. J. Barker, N. C. Blacker, P. R. Phillips, N. W. Alcock, W. Errington, M. G. H. Wallbridge, *J. Chem. Soc., Dalton Trans.* **1996**, 431-437.
6. D. Abeysekera, K. N. Robertson, T. S. Cameron, J. A. C. Clyburne, *Organometallics* **2001**, 20, 5532-5536.
7. C. Villiers, P. Thuery, M. Ephritikhine, *Eur. J. Inorg. Chem.* **2004**, 23, 4624-4632.
8. D. A. Kissounko, Y. H. Zhang, M. B. Harney, L. R. Sita, *Adv. Synth. Catal.* **2005**, 347, 426-432.
9. T. Chivers, C. Fedorchuk, M. Parvez, *Organometallics* **2005**, 24, 580-586.
10. B. S. Lim, A. Rahtu, J.-S. Park, R. G. Gordon, *Inorg. Chem.* **2003**, 42, 7951-7958.
11. a) D. Hausmann, J. Becker, S. Wang, R. G. Gordon, *Science* **2002**, 298, 402-406
b) B. S. Lim, A. Rahtu, R. G. Gordon, *Nat. Mater.* **2003**, 2, 749-754
c) R. G. Gordon, S. Barry, R. N. R. Broomhall-Dillard, D. J. Teff, *Adv. Mater. Optics Electron.* **2000**, 10, 201-211.
12. A. I. Kingon, J. P. Maria, S. K. Streiffer, *Nature* **2000**, 406, 1032-1038.
13. Z. Li, S. T. Barry, R. G. Gordon, *Inorg. Chem.* **2005**, 44, 1728-1735.
14. F. T. Edelmann, D. M. M. Freckmann, H. Schumann, *Chem. Rev.* **2002**, 102, 1851-1896.
15. H. E. Abdou, A. A. Mohamed, J. M. Lopez-de-Luzuriaga, J. P. Fackler, *J. Cluster Sci.* **2004**, 15, 397-411.
16. a) R. T. Boere, M. L. Cole, P. C. Junk, *New J. Chem.* **2005**, 29, 128-134;
b) F. A. Cotton, N. S. Dalal, C. Y. Liu, C. A. Murillo, J. M. North, X. P. Wang, *J. Am. Chem. Soc.* **2003**, 125, 12945-12952.
c) M. J. McNevin, J. R. Hagadorn, *Inorg. Chem.* **2004**, 43, 8547-8554
d) P. de Rouffignac, J. S. Park, R. G. Gordon, *Chem. Mater.* **2005**, 17, 4808-4814
e) W. X. Zhang, M. Nishiura, Z. M. Hou, *J. Am. Chem. Soc.* **2005**, 127, 16788-16789
f) M. L. Cole, C. Jones, P. C. Junk, M. Kloth, A. Stasch, *Chem. Eur. J.* **2005**, 11, 4482-4491.

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