

METALS • INORGANICS • ORGANOMETALLICS • CATALYSTS • LIGANDS • NANOMATERIALS • CUSTOM SYNTHESIS • cGMP FACILITIES

<p>20-8200</p>	<p>27-0468 &amp; 27-0469</p>	<p>27-0485 &amp; 27-0486</p>	<p>29-7100</p>
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<p>03-8000</p>	<p>71-1050</p>	<p>12-0865</p>	<p>12-0845</p>
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<p>50-1170</p>	<p>70-1000</p>	<p>39-1550</p>	<p><i>These products are sold under, use subject to, terms and conditions of label license at <a href="http://www.strem.com/harvard2">www.strem.com/harvard2</a></i></p>

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<b>20-8200</b>	<b>Bis(N,N'-diisopropylformamidinato)calcium(II) dimer, (99.99 %-Ca) PURATREM (1959584-78-1)</b>	1g
	C <sub>28</sub> H <sub>60</sub> Ca <sub>2</sub> N <sub>8</sub> ; FW: 588.99; tan to light-brown pwdr. <i>air sensitive, moisture sensitive</i>	5g
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> , <b>2016</b> , 55, 10228 –10233.		
<b>27-0468</b>	<b>Bis(N-t-butyl-N'-ethylpropanimidamido)cobalt(II), min. 98% (1011477-51-2)</b>	1g
	C <sub>18</sub> H <sub>38</sub> CoN <sub>4</sub> ; FW: 369.45; blue-green liq. <i>air sensitive, moisture sensitive</i>	5g
Technical Note:		
1. Volatile cobalt complex for the atomic layer deposition of cobalt metal.		
References:		
1. <i>Chemistry of Materials</i> , <b>2014</b> , 26, 2642		
2. <i>J. Phys. Chem. Lett.</i> , <b>2014</b> , 5, 1091		
3. <i>Dalton T.</i> , <b>2008</b> , 19, 2592		
<b>27-0469</b>	<b>Bis(N-t-butyl-N'-ethylpropanimidamido)cobalt(II), min. 98% (99.99%-Co) PURATREM (1011477-51-2)</b>	1g
	C <sub>18</sub> H <sub>38</sub> CoN <sub>4</sub> ; FW: 369.45; blue-green liq. <i>air sensitive, moisture sensitive</i>	5g
Technical Note:		
1. Volatile Cobalt precursor for ALD/CVD		
References:		
1. <i>J. Phys. Chem. Lett.</i> , <b>2014</b> , 5, 1091		
2. <i>Chem. Mater.</i> , <b>2014</b> , 26, 2642		
3. <i>J. Mater. Chem. C.</i> , <b>2015</b> , 3, 2500		
<b>27-0485</b>	<b>Bis(N,N'-di-i-propylacetamidinato)cobalt(II), min. 98% Co(iPr-MeAMD)<sub>2</sub> (635680-58-9)</b>	250mg
amp	C <sub>16</sub> H <sub>34</sub> CoN <sub>4</sub> ; 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 <sub>9</sub> S <sub>8</sub> and its application for super conductors.		
3. Complex used in the atomic layer deposition of cobalt sulfide.		
References:		
1. <i>Nano Letters</i> , <b>2015</b> , 15, 6689		
2. <i>ACS Nano</i> , <b>2015</b> , 9, 8484		
<b>27-0486</b>	<b>Bis(N,N'-di-i-propylacetamidinato)cobalt(II), min. 98% (99.99%-Co) PURATREM (Co(iPr-MeAMD)<sub>2</sub> (635680-58-9)</b>	250mg
amp	C <sub>16</sub> H <sub>34</sub> CoN <sub>4</sub> ; 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)		
<b>29-7100</b>	<b>Bis(N,N'-di-sec-butylacetamidinato)dicropper(I), 99% (695188-31-9)</b>	250mg
amp	(C <sub>10</sub> H <sub>21</sub> N <sub>2</sub> ) <sub>2</sub> Cu <sub>2</sub> ; 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> , <b>2011</b> , 23, 4411		
2. <i>J. Am. Chem. Soc.</i> , <b>2009</b> , 131, 18159		
3. <i>Appl. Phys. Lett.</i> , <b>2009</b> , 94, 123107		
4. <i>Inorg. Chem.</i> , <b>2005</b> , 44, 1728		
<b>64-3575</b>	<b>Tris(N,N'-di-i-propylformamidinato)gadolinium(III), (99.999+%-Gd) PURATREM Gd-FMD</b>	1g
<b>NEW</b>	C <sub>21</sub> H <sub>45</sub> GdN <sub>6</sub> ; FW: 538.87; white to off-white pwdr. <i>air sensitive, moisture sensitive</i>	5g

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<b>26-0145</b>	<b>Bis(N,N'-di-t-butylacetamidinato)iron (II), min. 98% (635680-56-7)</b>	250mg
amp	C <sub>20</sub> H <sub>42</sub> N <sub>4</sub> 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> , <b>2010</b> , 157, D454		
2. <i>ECS Transactions</i> , <b>2009</b> , 25, 181		
3. <i>ACS Appl. Mater. Interfaces</i> <b>2015</b> , 7, 16138		
<b>57-1200</b>	<b>Tris(N,N'-di-i-propylformamidinato)lanthanum(III), (99.999+%-La) PURATREM La-FMD (1034537-36-4)</b>	1g
amp	C <sub>21</sub> H <sub>45</sub> LaN <sub>6</sub> ; 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 <sub>2</sub> O <sub>3</sub> , LaLuO <sub>3</sub> , LaScO <sub>3</sub> , and LaYO <sub>3</sub> thin films.		
References:		
1. <i>Appl. Phys. Lett.</i> , <b>2009</b> , 94, 262904		
2. <i>Electrochem. Solid-State Lett.</i> , <b>2009</b> , 12, G13		
3. <i>Appl. Phys. Lett.</i> , <b>2010</b> , 97, 162910		
4. <i>J. Electrochem. Soc.</i> , <b>2011</b> , 158, H447		
5. <i>ECS Trans.</i> , <b>2012</b> , 45, 95		
6. <i>Nano Lett.</i> , <b>2013</b> , 13, 594		
7. <i>J. Crystal Growth</i> , <b>2013</b> , 363, 150		
8. <i>ECS Trans.</i> , <b>2013</b> , 54, 255		
9. <i>App. Surface Sci.</i> , <b>2014</b> , 292, 880		
10. <i>Proc. SPIE</i> , <b>2014</b> , 8987, 898712		
<b>57-1500</b>	<b>Tris(N,N'-di-i-propylpentylamidinato)lanthanum(III), 98% (99.999%-La) PURATREM</b>	1g
amp	C <sub>33</sub> H <sub>69</sub> N <sub>6</sub> La; FW: 688.84; off white to beige solid <i>air sensitive, moisture sensitive</i>	5g
<b>03-8000</b>	<b>(N,N'-Di-i-propylacetamidinato)lithium, min. 97% (99.99+%-Li) PURATREM</b>	1g
	C <sub>8</sub> H <sub>17</sub> N <sub>2</sub> Li; FW: 148.17; off white to beige solid <i>air sensitive, moisture sensitive</i>	5g
<b>71-1050</b>	<b>Tris(N,N'-di-i-propylacetamidinato)lutetium(III), 99%</b>	250mg
amp	Lu(C <sub>8</sub> H <sub>17</sub> N <sub>2</sub> ) <sub>3</sub> ; FW: 598.67; white to off-white powdr. <i>air sensitive, moisture sensitive</i>	1g 5g
<b>12-0865</b>	<b>Bis(N-t-butyl-N'-ethylpropanimidamidato)magnesium, min. 98% (99.99+%-Li) PURATREM</b>	1g
amp	C <sub>18</sub> H <sub>38</sub> MgN <sub>4</sub> ; FW: 334.82; off-white to tan solid <i>air sensitive, moisture sensitive</i>	5g
<b>12-0845</b>	<b>Bis(N,N'-di-sec-butylacetamidinato)magnesium, 99%</b>	1g
	C <sub>20</sub> H <sub>42</sub> MgN <sub>4</sub> ; FW: 362.88; colorless to pale yellow liq. <i>moisture sensitive</i>	5g
<b>25-0230</b>	<b>Bis(N,N'-di-i-propylpentylamidinato)manganese(II), min. 98% (1188406-04-3)</b>	250mg
amp	C <sub>22</sub> H <sub>46</sub> MnN <sub>4</sub> ; FW: 421.57; brown solid <i>air sensitive, moisture sensitive</i>	1g 5g
References:		
1. <i>J. Phys. Chem. C</i> , <b>2012</b> , 116, 23585		
<b>28-0045</b>	<b>Bis(N,N'-di-t-butylacetamidinato)nickel(II), (99.999%-Ni) PURATREM (940895-79-4)</b>	250mg
amp	C <sub>20</sub> H <sub>42</sub> N <sub>4</sub> 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 <sub>2</sub> S.		
References:		
1. <i>Chem. Mater.</i> , <b>2010</b> , 22, 3060		
2. <i>Chem. Mater.</i> , <b>2016</b> , 28, 1155.		

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

<b>70-1000</b>	<b>Tris(N,N'-di-i-propylacetamidinato)ytterbium(III), 99%</b>	250mg
	Yb(C <sub>8</sub> H <sub>17</sub> N <sub>2</sub> ) <sub>3</sub> ; FW: 596.74; white to off-white powdr. <i>air sensitive, moisture sensitive</i> Note: ALD precursor.	1g 5g
<b>39-1550</b>	<b>Tris(N,N'-di-i-propylformamidinato)yttrium(III), 97%</b>	250mg
amp	C <sub>21</sub> H <sub>45</sub> N <sub>6</sub> Y; FW: 470.53; light beige-yellow solid <i>air sensitive, moisture sensitive</i>	1g 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.<sup>[1-4]</sup> Great interest has been focused on the applicability of the complexes as single-source precursors of advanced functional materials,<sup>[5]</sup> 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.<sup>[10-12]</sup> The precursors need to be designed in such a way that the compounds are volatile and thermally stable at growth temperatures.<sup>[10,13]</sup> 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.<sup>[10,12-14]</sup> The volatility and thermal stability of symmetric amidinates of transition metals and lanthanum with oxidation states of one (Cu, Ag, Au),<sup>[15]</sup> two (Mg, Mn, Fe, Co, Ni),<sup>[16]</sup> three (Ti, V, Y, Al, Ga, La),<sup>[17]</sup> and four (Ru, Hf)<sup>[8]</sup> 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. McNeven, 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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