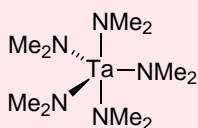


# NEW!

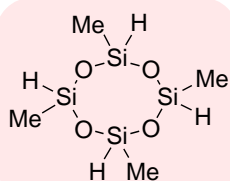
# CVD Thin-Film Precursors

Chemical Vapor Deposition (CVD) is an essential process in the fabrication of integrated circuits (IC). CVD is a simple technique that typically involves the decomposition of a volatile precursor, usually at reduced pressure, to give a thin solid film on a suitable substrate. Aldrich now offers several high-purity CVD precursors, some of which are listed below. Our thin-film precursors are available in up to 99.99999% metals purity in custom quantities ranging from several grams to hundreds of kilograms; various packaging options are available. We welcome technical inquiries about these products and can produce custom materials to your individual purity specifications. For more information, please call our Technical Services Department at (800) 231-8327. To receive a prompt quotation on bulk quantities, call Sigma-Aldrich Fine Chemicals at (800) 336-9719, or contact your local Sigma-Aldrich office.



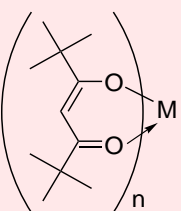
**49,686-3 Pentakis(dimethylamino)tantalum**, 99.9% (packaged in ampules) ..... **5g**

Pentakis(dimethylamino)tantalum is a volatile solid CVD precursor to tantalum nitride (TaN) thin films. It also gives tantalum oxide ( $Ta_2O_5$ ) thin films when  $O_2$ ,  $H_2O$ ,  $NO$  or  $H_2O_2$  is present during the deposition process.<sup>1,2</sup> Tantalum oxide thin films show promise as gate dielectric materials in the manufacture of IC's.



**51,299-0 2,4,6,8-Tetramethylcyclotetrasiloxane**, 99.5+% (TMCTS) ..... **25mL**

Aldrich now offers a high-purity grade (99.5+% by gas chromatography) of 2,4,6,8-tetramethylcyclotetrasiloxane (TMCTS) for electronic applications. This material is a precursor for gate dielectrics in thin-film transistors (TFT),<sup>3</sup> and is a component of photochemically formed  $SiO_x$  monolayers on  $TiO_2$ .<sup>4</sup>

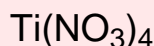


**47,885-7**: M=Pb n=2  
**47,886-5**: M=Zr n=4

**47,885-7 Lead bis(2,2,6,6-tetramethyl-3,5-heptanedionate)**, 99.99+% ..... **5g; 25g**

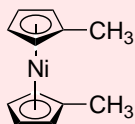
**47,886-5 Zirconium tetrakis(2,2,6,6-tetramethyl-3,5-heptanedionate)**, 99.99+% ..... **5g; 25g**

Both of these CVD precursors have been employed in the manufacture of advanced dielectric and ferroelectric thin films. Lead bis(2,2,6,6-tetramethyl-3,5-heptanedionate) is used for growing lead oxide<sup>5</sup> and mixed-metal thin films<sup>6</sup> by a variety of deposition methods. Zirconium bis(2,2,6,6-tetramethyl-3,5-heptanedionate) is a good precursor to zirconia ( $ZrO_2$ ) and yttria-stabilized zirconia thin films.<sup>7</sup>



**49,971-4 Titanium(IV) nitrate**, 99.9+% ..... **1g**

Titanium(IV) nitrate, also called tetranitratotitanium(IV), has recently been studied as a CVD precursor to titanium dioxide thin films.<sup>8</sup>



**51,047-5 Bis(methylcyclopentadienyl)nickel**, 97% ..... **1g; 5g**

Bis(methylcyclopentadienyl)nickel is a volatile OMCVD precursor for the controlled growth of nickel nanoparticles on silicon substrates. Possible uses for metallic nickel nanoparticles embedded on silicon include the manufacture of high-density storage media.<sup>9</sup> Nickel oxide thin films are generated via OMCVD in the presence of  $O_2$  or  $H_2O_2$ .<sup>10</sup>

**References:** (1) Son, K. -A. et al. *J. Vac. Sci. Technol.*, A **1998**, 16, 1670. (2) Son, K. -A. et al. *Appl. Phys. Lett.* **1998**, 72, 1187. (3) Wang, A. W. et al. *Mater. Res. Soc. Symp. Proc.* **1997**, 424, 281. (4) Tada, H.; Tanaka, M. *Thin Solid Films* **1996**, 281, 404. (5) Jones, A. C. et al. *Chem. Vap. Deposition* **1998**, 4, 46. (6) Shin, J. C. et al. *J. Korean Phys. Soc.* **1998**, 32, S1529. (7) Garcia, G. et al. *Thin Solid Films* **1998**, 317, 241. (8) Gilmer, D. C. et al. *Mater. Res. Soc. Symp. Proc.* **1998**, 495, 45. (9) Fraser, B. et al. *Chem. Mater.* **1996**, 8, 1858. (10) Kumagai, H. et al. *J. Mater. Sci. Lett.* **1996**, 15, 1081.



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