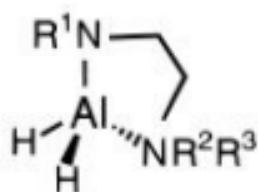


$\text{H}_2\text{Al}\{\text{N}(\text{Me})\text{C}_2\text{H}_4\text{NMe}_2\}$ (2, TRMEDA) and $\text{H}_2\text{Al}\{\text{N}(\text{Et})\text{C}_2\text{H}_4\text{NEt}_2\}$ (3, TREEDA),

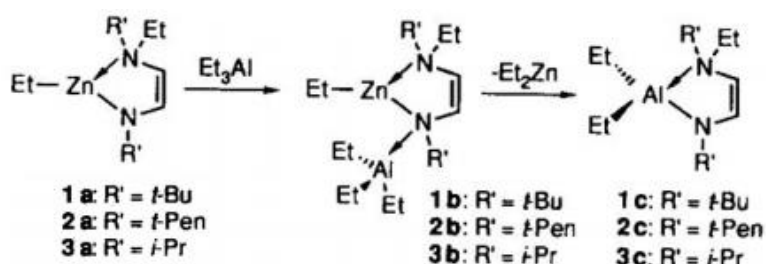


$\text{R}^1 = \text{Et}; \text{R}^2, \text{R}^3 = \text{Me}, \quad \mathbf{1}$

$\text{R}^1 = \text{Me}; \text{R}^2, \text{R}^3 = \text{Me}, \quad \mathbf{2}$

$\text{R}^1 = \text{Et}; \text{R}^2, \text{R}^3 = \text{Et}, \quad \mathbf{3}$

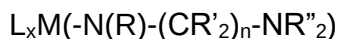
[0014] Wissing et al. (Journal of Organometallic Chemistry, 459, 11-16, 1993) discloses 1,2-alkyl shift within a chelate bonded organoaluminum-enamine **1c** -**3c**,



Summary

[0015] Disclosed is a process of selectively depositing a metal-containing film comprising the steps of:

- providing a surface having a plurality of materials exposed thereon simultaneously; and
- exposing the surface to a vapor of a metal-containing film-forming composition that contains a precursor having the formula:



wherein M is a Group 12, Group 13, Group 14, Group 15, Group IV or Group V element; $x+1$ is the oxidation state of the M; L is an anionic ligand; R, R'' each are independently a $\text{C}_1\text{-C}_{10}$ linear, branched or cyclic alkyl, alkenyl, or trialkylsilyl group; R' is H or a $\text{C}_1\text{-C}_{10}$ linear, branched or cyclic alkyl, alkenyl or trialkylsilyl group; $n=1-4$; and

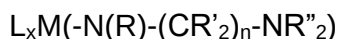
- preferentially or selectively depositing a film on one or more of, but less than all of, the plurality of materials on the surface in a vapor deposition process,

wherein at least one of the materials on the surface is at least partially blocked by a blocking agent thereby reducing or preventing a deposition of the metal-containing film on said blocked material.

[0015a] In one aspect there is provided a process of selectively depositing a metal-containing film, the process comprising the steps of:

a) providing a surface having a plurality of materials exposed thereon simultaneously; and

b) exposing the surface to a vapor of a metal-containing film-forming composition that contains a precursor having the formula:



wherein M is a Group 12, Group 13, Group 14, Group 15, Group IV or Group V element; x+1 is the oxidation state of the M; L is an anionic ligand; R, R'' each are independently a C₁-C₁₀ linear, branched or cyclic alkyl, alkenyl, or trialkylsilyl group; R' is H or a C₁-C₁₀ linear, branched or cyclic alkyl, alkenyl or trialkylsilyl group; n = 1 – 4; and

c) preferentially or selectively depositing the metal-containing film on one or more of, but less than all of, the plurality of materials on the surface in a vapor deposition process,

wherein at least one of the materials on the surface is at least partially blocked by a blocking agent thereby reducing or preventing a deposition of the metal-containing film on said blocked material.

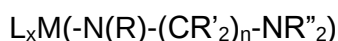
[0016] Also, the disclosed is a process of selectively depositing Al₂O₃ film comprising the steps of:

What is claimed is:

1. A process of selectively depositing a metal-containing film, the process comprising the steps of:

a) providing a surface having a plurality of materials exposed thereon simultaneously; and

b) exposing the surface to a vapor of a metal-containing film-forming composition that contains a precursor having the formula:



wherein M is a Group 12, Group 13, Group 14, Group 15, Group IV or Group V element; $x+1$ is the oxidation state of the M; L is an anionic ligand; R, R'' each are independently a C₁-C₁₀ linear, branched or cyclic alkyl, alkenyl, or trialkylsilyl group; R' is H or a C₁-C₁₀ linear, branched or cyclic alkyl, alkenyl or trialkylsilyl group; $n = 1 - 4$; and

c) preferentially or selectively depositing the metal-containing film on one or more of, but less than all of, the plurality of materials on the surface in a vapor deposition process,

wherein at least one of the materials on the surface is at least partially blocked by a blocking agent thereby reducing or preventing a deposition of the metal-containing film on said blocked material.

2. The process of claim 1, wherein the vapor deposition process is an ALD process.

3. The process of claim 1, further comprising exposing the surface to a co-reactant selected from an oxidizer agent or a nitrogen agent.

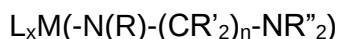
4. The process of claim 3, further comprising the steps of repeating the exposing to the vapor of the metal-containing film-forming composition and the exposing to the co-reactant until a desired thickness of the metal-containing film is formed; and

purging excess vapor of the metal-containing film-forming composition and excess co-reactant using an inert gas, respectively, to separate each exposure, wherein the inert gas is N₂, Ar, Kr or Xe.

5. The process of claim 3, wherein the co-reactant is selected from O₃, O₂, H₂O, H₂O₂, D₂O, ROH wherein R = C₁ – C₁₀ linear or branched hydrocarbon, NH₃, NO, N₂O, hydrazines, amines or combinations thereof.
6. The process of claim 3, wherein the co-reactant is H₂O.
7. The process of claim 1, wherein the blocking agent forms a SAM layer on the at least one of the materials by dipping the surface in the blocking agent or vapor spraying the surface with the blocking agent.
8. The process of claim 1, wherein the plurality of the materials include at least a dielectric material and at least a metal material on the surface.
9. The process of claim 8, wherein the metal-containing film is deposited on the dielectric film but not deposited on the metal film by blocking the reactivity of the metal film by a metal blocking agent.
10. The process of any one of claims 1, 8 and 9, wherein the metal blocking agent is selected from an alkyl or fluoroalkyl compounds having a surface reactive chemical function group selected from phosphonic acids, carboxylic acids, thiols, or triazoles.
11. The process of claim 8, wherein the metal-containing film is deposited on the metal material but not deposited on the dielectric material by blocking the reactivity of the dielectric material by a dielectric blocking agent.
12. The process of any one of claims 1, 8 and 11, wherein the dielectric blocking agent is a compound having the formula R_{4-a}SiX_a, wherein each X are independently a surface hydroxyl reactive group (halide, alkylamino, alkoxy, acetamide, etc.), and each R are selected from H, a C₁-C₂₀ alkyl or fluoroalkyl group or mixture thereof.
13. The process of claim 1, wherein the surface is exposed to the precursor at a temperature ranging from room temperature to 500°C.
14. The process of claim 1, wherein the precursor is (NMe₂)₂Al(-NEt-(CH₂)₂-NEt₂).

15. The process of claim 14, wherein the metal-containing film is an Al₂O₃ film.

16. A composition for selective deposition of a metal-containing film comprising a precursor having the formula:



wherein M is a Group 12, Group 13, Group 14, Group 15, Group IV or Group V element; x+1 is the oxidation state of the M; L is an anionic ligand, independently selected from dialkylamine, alkoxy, alkylimine, bis(trialkylsilylamine), amidinate, betadiketonate, ketoimine, halide, or the like; R, R'' each are independently a C₁-C₁₀ linear, branched or cyclic alkyl, alkenyl, or trialkylsilyl group; R' is H or a C₁-C₁₀ linear, branched or cyclic alkyl, alkenyl or trialkylsilyl group; n = 1 – 4.

17. The composition of claim 16, wherein the precursor is (NMe₂)₂Al(-NEt-(CH₂)₂-NEt₂).

18. The composition of either claim 16 or claim 17, wherein the composition comprises between 95% w/w and 100.0% w/w of the precursor.

19. The composition of either claim 16 or claim 17, wherein the composition comprises between 0.0% w/w and 5.0% w/w impurities.

20. A process of selectively depositing Al₂O₃ film, the process comprising the steps of:

- a) providing a surface having at least one dielectric material and at least one metal material exposed thereon simultaneously;
- b) exposing the surface to a vapor of (NMe₂)₂Al(-NEt-(CH₂)₂-NEt₂); and
- c) exposing the surface to a co-reactant H₂O, wherein the at least one dielectric material is at least partially blocked by a blocking agent dimethyldichlorosilane (DMDCS) from the deposition of the Al₂O₃ film through an ALD process.