

Claims

1. A film material comprising a combination of a metal amide with a metal oxide, or a combination of a metal halide with a metal alloy, wherein said metal is selected from Group I of the Periodic Table of Elements.
2. The film material of claim 1, wherein said metal is selected from the group consisting of lithium, sodium, and potassium.
3. The film material of claim 1 or 2, wherein said metal halide is selected from the group consisting of metal fluoride, metal chloride, metal bromide and metal iodide.
4. The film material of any one of claims 1 to 3, wherein said metal alloy further comprises an element selected from the group consisting of a transition metal, a Group 14 metal and a Group 14 metalloid.
5. The film material of any one of claims 1 to 4, which is monophasic.
6. The film material of any one of claims 1 to 5, which is biphasic.
7. The film material of any one of the preceding claims, where the thickness of the film material is 3 to 90 μm .
8. A process of preparing a film material comprising the step of contacting a solid phase material and a vapor phase material, wherein the solid phase material is a metal selected from Group I of the Periodic Table, and wherein the vapor phase material comprises a combination of an amide precursor with an oxide precursor, or a combination of a metal halide precursor and a metalloid halide precursor.
9. The process of claim 8, wherein said Group I metal is selected from the group consisting of lithium, sodium, and potassium.
10. The process of claim 8 or 9, wherein said metal of said metal halide precursor is a transition metal or a Group 14 metal.
11. The process of any one of claims 8 to 10, wherein said metalloid of said metalloid halide precursor is a Group 14 metalloid.
12. The process of any one of claims 8 to 11, wherein the halide of said metal halide precursor or said metalloid halide precursor is selected from the group consisting of fluoride, chloride, bromide and iodide.
13. The process of any one of claims 8 to 12, wherein the oxide precursor is water.
14. The process of any one of claims 8 to 13, wherein the amide precursor is selected from the group consisting of anhydrous ammonia, anhydrous hydrazine, urea and ammonia water.
15. The process of any one of claims 8 to 14, wherein the vapor pressure of the precursor is higher than 22 mmHg at ambient environment conditions (1 atm and 30 $^{\circ}\text{C}$).
16. The process of any one of claims 8 to 15, wherein the vapor concentration of the vapor phase material is in the range of 10 to 900×10^4 ppm.

17. The process of any one of claims 8 to 16, wherein the film material is obtained at a growth rate of 0.1 $\mu\text{m/s}$ to 1 $\mu\text{m/s}$.
- 5 18. An interphase protected sodium metal anode, wherein said interphase is a film material of any one of claims 1 to 7.
19. An electrochemical cell comprising the sodium metal anode of claim 18.
- 10 20. The electrochemical cell of claim 19, which is operable at a temperature range of 10 to 40°C, wherein the sodium anode is in solid form.