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Segal et al.

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(54) **METHODS OF FORMING ALUMINUM-COMPRISING PHYSICAL VAPOR DEPOSITION TARGETS; SPUTTERED FILMS; AND TARGET CONSTRUCTIONS**

(52) **U.S. Cl.** **148/437; 72/256; 148/438; 148/439; 148/440**

(57) **ABSTRACT**

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The invention includes a method of forming an aluminum comprising physical vapor deposition target. An aluminum comprising mass is deformed by equal channel angular extrusion. The mass is at least 99.99% aluminum and further comprises less than or equal to about 1,000 ppm of one or more dopant materials comprising elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tl, Tm, V, W, Y, Yb, Zn and Zr. After the aluminum comprising mass is deformed, the mass is shaped into at least a portion of a sputtering target. The invention also encompasses a physical vapor deposition target consisting essentially of aluminum and less than or equal to 1,000 ppm of one or more dopant materials comprising elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tl, Tm, V, W, Y, Yb, Zn and Zr. Additionally, the invention encompasses thin films.

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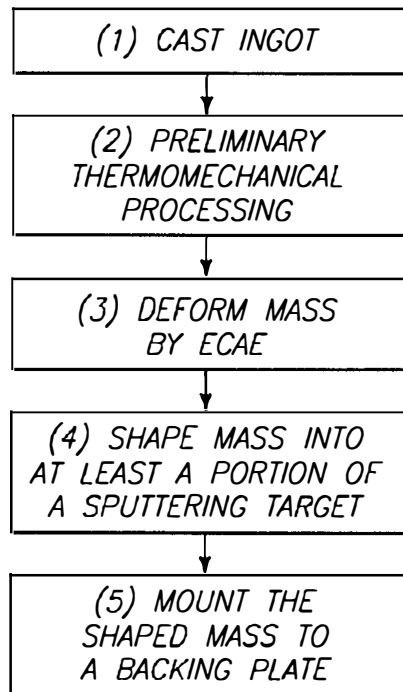
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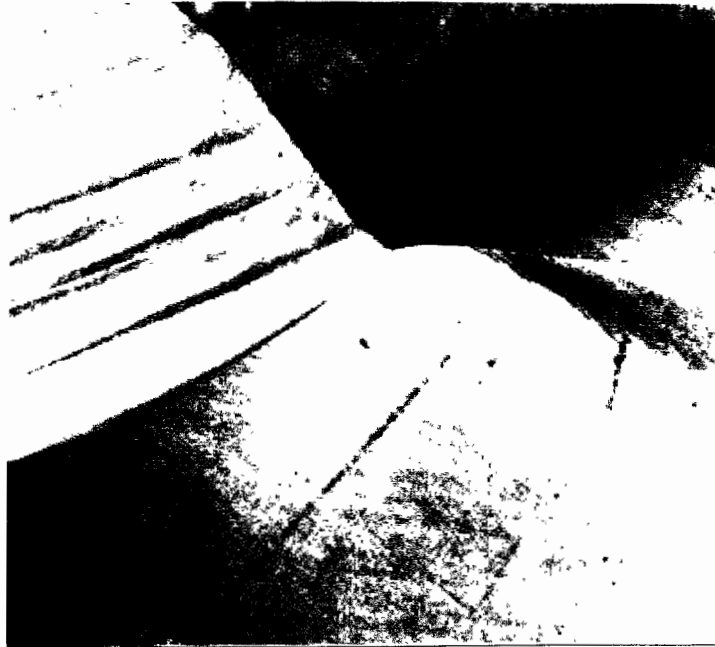


Fig. 1
PRIOR ART

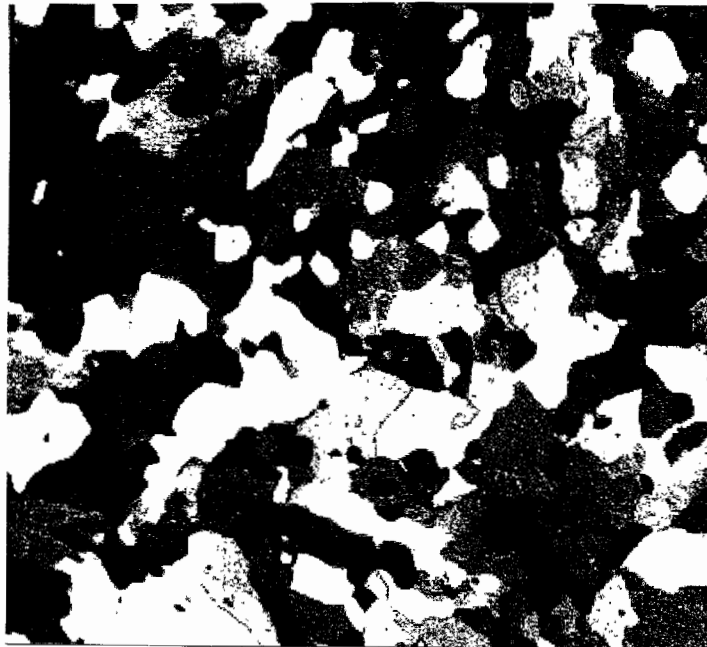


Fig. 2
PRIOR ART



FIG 3
PRIOR ART

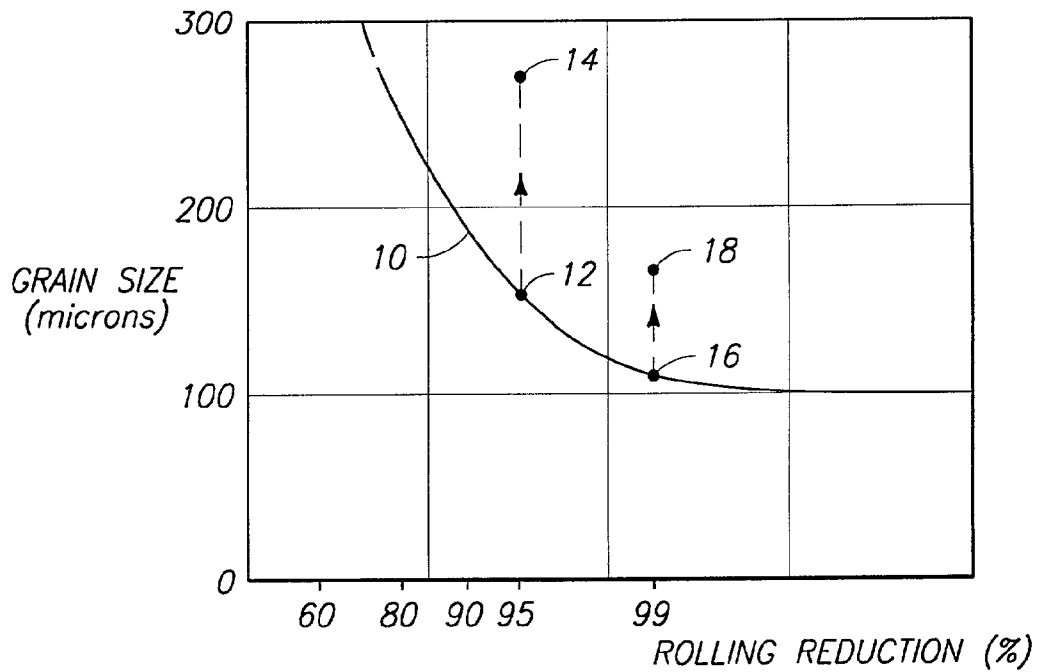


FIG 4
PRIOR ART

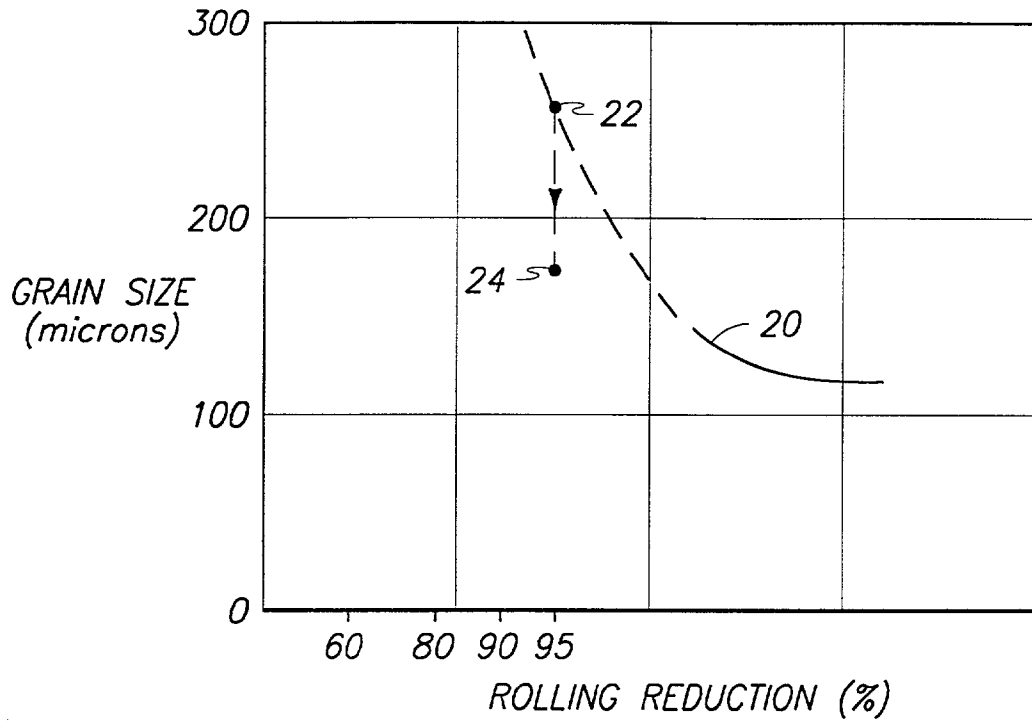


Fig 5
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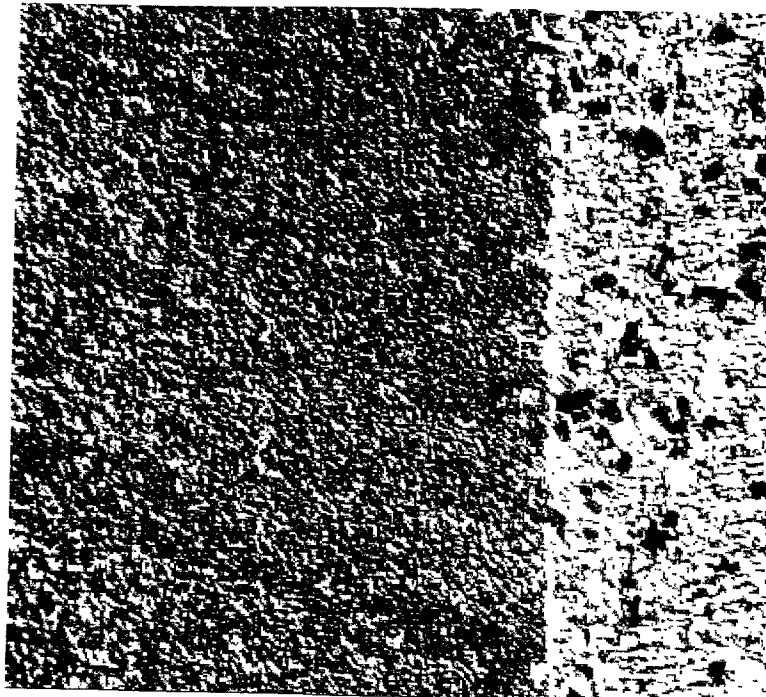
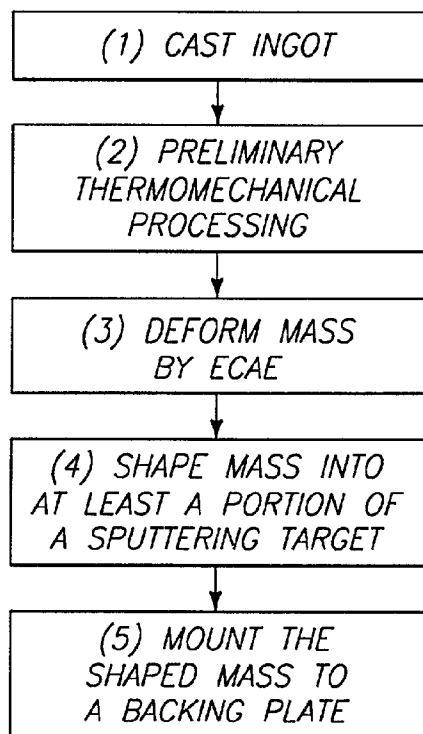


Fig 6
PRIOR ART



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PRIOR ART



II II II II *BB*

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