TABELA DE EVAPORAÇÃO POR DUAS FONTES

TABLE 14 Two-source Evaporation, Experimental Conditions, and Types of Films Obtained

Evaporated constituents	Evaporation conditions and method of control	Substrate temp, °C	Films obtained	References
		Alloy and Multiphase Films		
Cu + Ni	Sequential evaporation	Low	Stratified films. Annealing at 200°C yields two-phase alloy films	241
Cu, Ag, Au, Mg, Sn, Fe, Co	Simultaneous evaporation from two sources. Ionization-rate monitor control, ±1%	−193	Binary alloy films of metastable structures	240
Cu, Ag, Au, Al, Ni, and others	Simultaneous evaporation from two sources. Rates adjusted by varying source temperatures	25–600	Binary alloy films of varying composition and structure	242
Ni + Fe	Two wire-ring sources, evaporation rates controlled by quartz-crystal oscillator	300	Permalloy films. $d' \approx 10$ Å s^{-1}	238
Nb + Sn	Two sources, rates monitored by particle impingement-rate monitor. Impingement ratio $N_{Nb}:N_{Sn} = 3$	25–700	Superconducting Nb_3Sn films. $d' \approx 2$ Å s^{-1}, $\alpha_c \approx 1$	243
V, Nb + Si, Sn	Two electron-gun sources, rates monitored by measuring ionization current	....	Superconducting films of approx composition Nb_3Sn and V_3Si	237
ZnS + LiF	Two sources, rates monitored by a microbalance. Variable impingement ratios	30–40	Mixed dielectric films of different composition. $d' = 10$–30 Å s^{-1}	244
Au, Cr + SiO, MgF_2	Two-source evaporation with ionization-rate monitor control (±1–2%)	25–300	Au-SiO, Au-MgF_2, Cr-SiO, and Cr-MgF_2 resistor films of different compositions	245
Cr + SiO	SiO source at 1100°C, Cr source at 1500°C. Impingement ratio varied with location on substrate	400	High-resistivity Cr-SiO films of variable composition	246

TABLE 14 Two-source Evaporation, Experimental Conditions, and Types of Films Obtained (Continued)

Evaporated constituents	Evaporation conditions and method of control	Substrate temp, °C	Films obtained	References
		Compound Films		
Cd + S	Two effusion ovens, Cd at 400–450°C, S at 120–150°C. Cd excess	400–650	Stoichiometric CdS crystals	232
Cd + Se	Impingement fluxes controlled by source temperature. $N_{Cd} = 2 \times 10^{16}$, $N_{Se} = 10^{16}$–10^{17} cm^{-2} s^{-1}	200	Stoichiometric CdSe films	247, 248
PbSe + PbTe	Source temperatures varied around 700°C	300	Epitaxial films of $PbSe_{1-x}Te_x$ on NaCl crystals	233
Bi + Te	Bi source at 750°C, Te source temperature variable. $N_{Te}:N_{Bi} = 10$–40	400–500	Stoichiometric films of Bi_2Te_3. n-type, 2×10^{19} electrons cm^{-3}	249
Bi + Se	Rate control by quartz-crystal oscillator. Se source at 250°C; Bi source temperature variable	52	Vitreous, semiconducting films of nonstoichiometric composition	250
Al + Sb	Source temperatures adjusted by quartz-crystal oscillator to yield $N_{Sb}:N_{Al}$ ratios of 1.6–16	550	Stoichiometric AlSb films. $d' \approx 10$ Å s^{-1}	234
Ga + As	Ga source at 940–970°C, As source at 300°C. $N_{As}:N_{Ga} \approx 10$; Ga impingement flux: 10^{15} cm^{-2} s^{-1}	550	Stoichiometric GaAs films. Epitaxial on (100) NaCl, polycrystalline on quartz	251
Ga + As	Ga source at 910°C, As source at 295°C. Deposition rate: <2 Å s^{-1}	375–450	Stoichiometric GaAs films on GaAs, Ge, and Al_2O_3 single-crystal substrates. Fiber texture to single-crystalline	252
In + As	Incident fluxes: $N_{In} = 5 \times 10^{16}$ cm^{-2} s^{-1}, $N_{As} = 5 \times 10^{16}$–$5 \times 10^{17}$ cm^{-2} s^{-1}	230–680	Stoichiometric InAs films; n-type	247, 248
In + Sb	Incident fluxes: $N_{In} = 5 \times 10^{16}$ cm^{-2} s^{-1} $N_{Sb} = 5 \times 10^{16}$–$5 \times 10^{17}$ cm^{-2} s^{-1}	400–520	Stoichiometric InSb films; n-type	247, 248
	Source temperatures adjusted by microbalance to yield $N_{Sb}:N_{In} = 1.1$	250	Stoichiometric InSb films; α_c of Sb ≈ 0.6	253