Effect of low-temperature oxidation and heat treatment in vacuum on Al-Be interdiffusion process

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Supporting information

Figure S1 contains the decomposed spectra collected from the reference samples: Be thin film (Figure S1 a) and Al thin film before (Figure S1 b) and after removal of the surface oxide by Ar+ ion sputtering (Figure S1 c, d). Approximation of the inelastic electron scattering background in the spectra was performed using a two-parameter function U2, which is based on the two-parameter universal cross-section proposed by Tougaard.[1,2] A modified Lorentzian line shape LF (α, β, w, m) with four parameters, determining the degree of line asymmetry (α, β), tail damping of the Lorentzian curve (w), and contribution of the Gaussian curve (m), was used for peak fitting. Additionally, all spectra were normalized to the area of the incident photon beam spot on the sample surface. The parameters obtained for the reference films spectra were shown in Table S1.
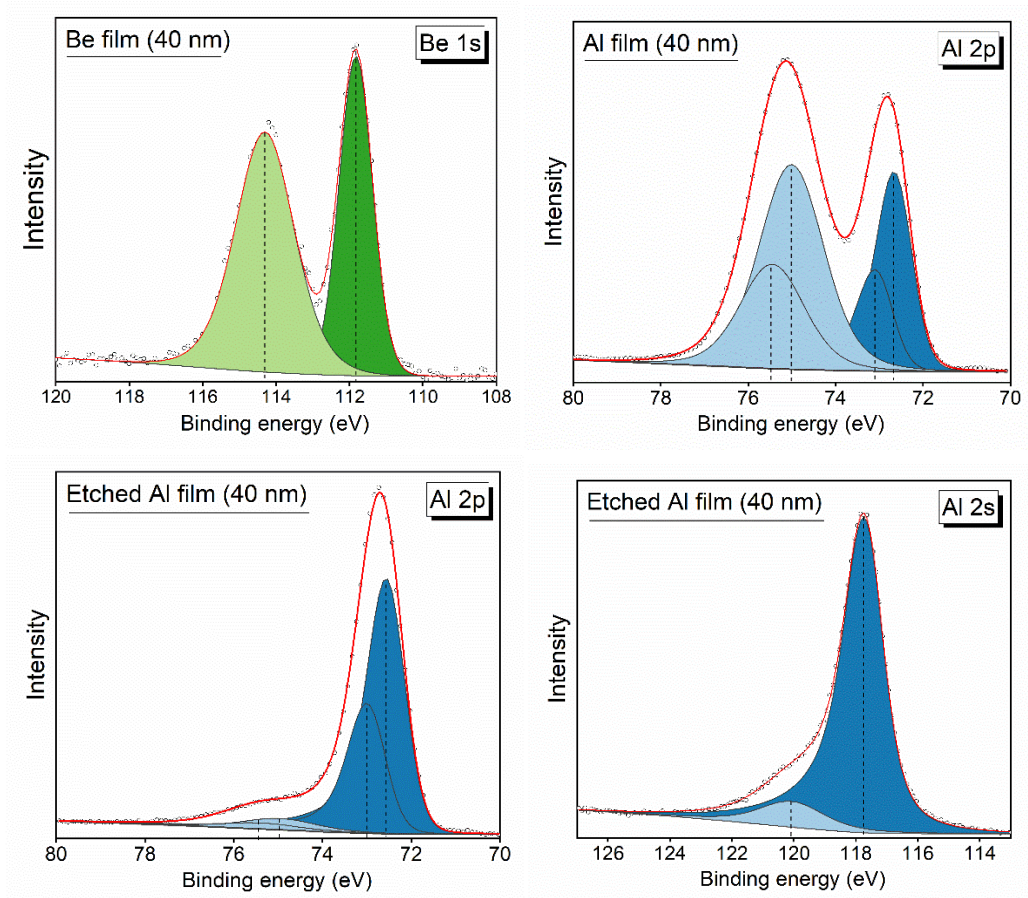
Figure S1. (a) Experimental and fitted Be 1s line spectra from collected Be thin film; experimental and fitted Al 2p and Al 2s spectra collected from Mo film before (b) and after (c, d) removing of the surface oxide by Ar$^+$ ion sputtering. The spectra were collected at 0° emission angle using photons of Al Kα photoemission line ($E_{h\nu}$ = 1486.6 eV).

Table S1. Parameters of the components derived through decomposition.

Assignment	Line	Position, eV	FWHM, eV	Line shape
Be		111.8	1,1	LF(1, 1, 10, 200)
	Be 1s			
BeO		114.3	1,9	LF(1, 1, 10, 200)
Al		72,7	1	LF(0.7, 1.4, 120, 400)
	Al 2p 3/2			
Al_2O_3		75,5	1,9	LF(1, 1, 30, 400)
Al		117,9	1,5	LF(0.65, 1, 40, 200)
	Al 2s			
Al_2O_3		119,9	2,4	LF(1, 1, 40, 200)

References

(1)   Tougaard, S. Low Energy Inelastic Electron Scattering Properties of Noble and Transition Metals. *Solid State Commun* **1987**, *61* (9), 547–549. https://doi.org/10.1016/0038-1098(87)90166-9.

(2)   Tougaard, S. Practical Algorithm for Background Subtraction. *Surf Sci* **1989**, *216* (3), 343–360. https://doi.org/10.1016/0039-6028(89)90380-4.