Supplementary Material for
Evolution of deformation texture in low modulus β Ti-34Nb-2Ta-(0,3)Zr-0.5O
alloys

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SI. Scheme for choosing hardening parameters for VPSC analysis:

The strain hardening behaviour of the two alloys was evaluated by performing hardness measurement at intermediate rolling steps up to a strain of 1.2. The hardness values were measured using a Vickers micro-hardness tester at 200 gf load and dwell time 10 s. data points were taken and the average value was obtained. For each strain level, at least ten hardness readings were taken.

Fig. S1: Experimental hardness plots at different rolling strain levels and simulated true stress-strain plots obtained from VPSC analysis, considering equal hardening on $\{110\}$ and $\{112\}$ planes, for (a) TNTZO and (b) TNTO alloys.

The stress-strain curves were simulated with different combinations of Voce hardening parameters. The simulated stress values for different strain levels were converted to the hardness values using multiplying the yield strength values by a factor of 3. The parameters that gave the best fit between simulated and experimental hardness values were further

considered for texture simulation. Initially, the simulation was done by assuming an equal hardening on $\{110\}\langle 111\rangle$ and $\{112\}\langle 111\rangle$ slip systems, with the Voce hardening parameters shown in Table S1. The experimental and simulated hardness plots are depicted in Fig. S1, while the simulated ODF sections ($\varphi_2 = 45^\circ$) are shown in Figs. S2 and S3 for the two alloys. It can be seen here that the ODF sections for the UDR samples of the two alloys display continuous α -fiber at $\varphi=0^\circ$, $\varphi=0-54.7$ which was absent in the experimental texture. The presence of α -fiber is caused by slip activity on $\{110\}$ planes rather than on $\{112\}$ planes. Therefore, the simulations were further carried out by trial and error by changing the hardening rates of $\{110\}\langle 111\rangle$ as well as $\{112\}\langle 111\rangle$ slip systems. The best fit in the simulated texture were found with parameters shown in Table 1 of the main file. The textures obtained in this case were more accurate representatives of the experimental texture (Fig. 11 and Fig. 12 of the manuscript file).

Table S1: Ratios between Voce hardening parameters considering equal slip.

Materials	Planes	Parameters			
		τ_0	τ_1	θ_0	θ_1
TNTZO	$\{110\}$	2.00	0.25	0.80	0.03
TNTO	$\{112\}$	2.00	0.30	1.00	0.03

Fig. S2: simulated ODF sections at $\varphi_2=45^\circ$ obtained from VPSC analysis of TNTZO alloy, considering parameters from table 3.1: (a) UDR30, (b) UDR50, (c) UDR70, (d) MSCR30, (e) MSCR50 and (f) MSCR70.

Fig. S3: simulated ODF sections at $\phi_2=45^\circ$ obtained from VPSC analysis of TNTO alloy, considering parameters from table 3.1: (a) UDR30, (b) UDR50, (c) UDR70, (d) MSCR30, (e) MSCR50 and (f) MSCR70.