Table 1: **Parameter values of two-state-two-pathways (TSTP) model fit.**

Interaction	x_1[nm]	x_2[nm]	Δx[nm]	k_1^0[s^{-1}]	k_2^0[s^{-1}]	τ_1[s]	τ_2[s]	ΔE[kJ mol^{-1}]
Alpha-ACE2	0.20 ± 0.06	0.08 ± 0.04	5.59 ± 6.04	3.37 ± 1.05	5.64 ± 2.04	0.30 ± 0.09	0.18 ± 0.06	107.15 ± 108.01
Omicron-ACE2	1.07 ± 0.19	0.12 ± 0.04	3.28 ± 0.88	0.80 ± 0.22	2.47 ± 0.77	1.25 ± 0.34	0.40 ± 0.13	27.87 ± 9.31
Delta-ACE2	0.51 ± 0.07	0.22 ± 0.01	4.32 ± 1.57	0.62 ± 0.13	0.85 ± 0.07	1.61 ± 0.35	1.17 ± 0.10	48.74 ± 19.04

Parameters of two-state-two-pathways (TSTP) model fit to the force dependent lifetimes of Omicron-ACE2, Alpha-ACE2 and Delta-ACE2 interaction measurements in PBS buffer ($t_{\text{dwell}} = 1.0$ s). All presented slip-catch-slip bonds were fit to the two-state-two-pathways model (according to Eq. 6 in the SI) depicted in Fig. 2 **d-f**.