

SUPPLEMENTARY MATERIAL

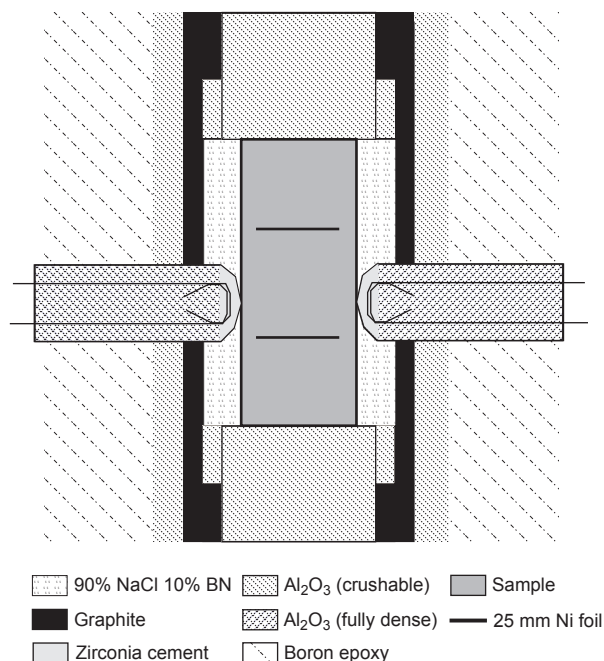


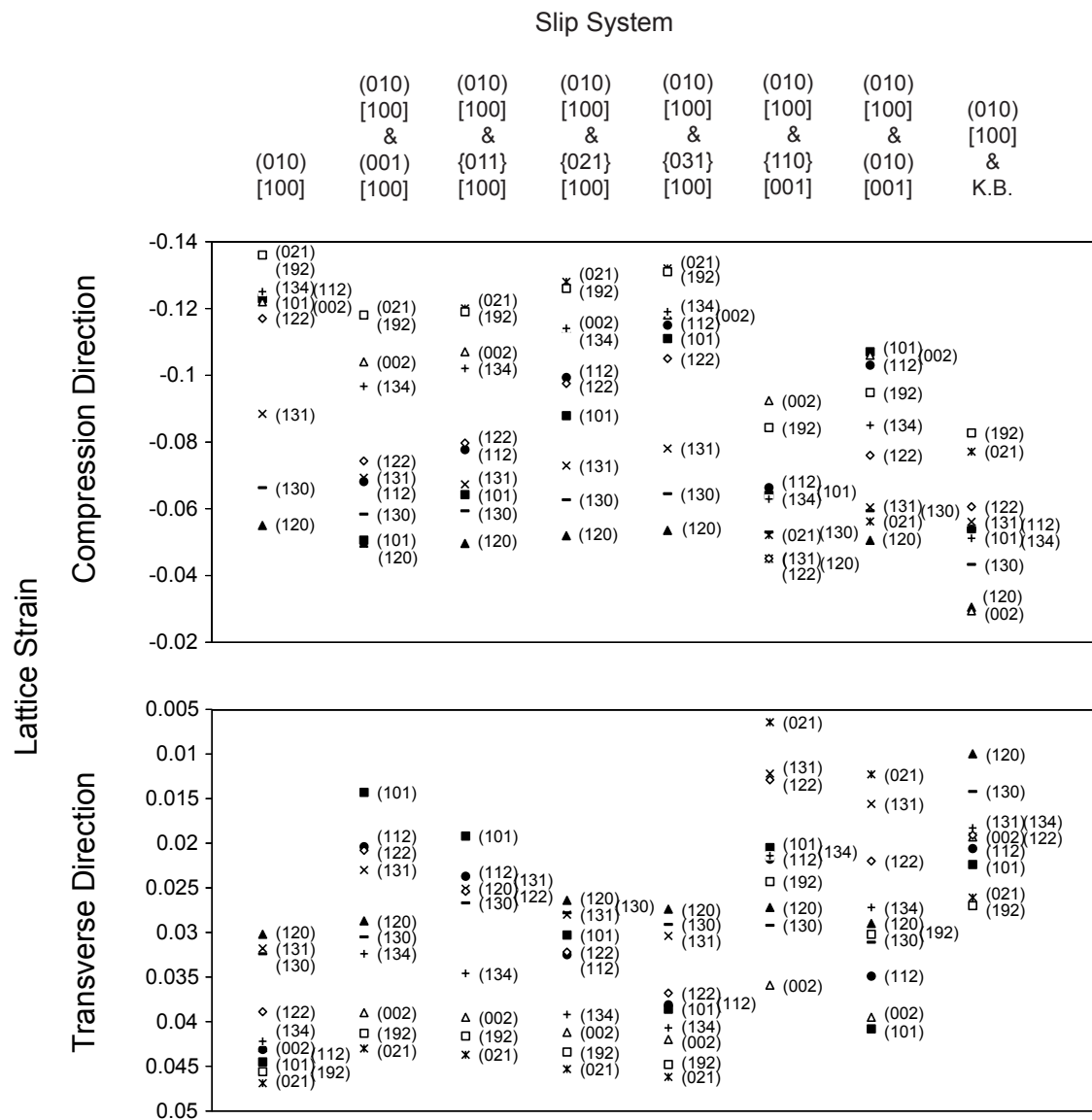
FIGURE S1. Sample assembly for Fay_33. The pressure medium consists of a 6mm cube of boron epoxy. The interior consists of nested sleeves surrounding a cylindrical sample. Two thermocouple are introduced on opposite sides of the assembly. The confining medium consists of NaCl with 10% BN.

TABLE S1. Residual plastic strain and peak stress for EPSC simulations.

Slip systems	Final strain (%) after unload	Peak stress as % of elastic only case
elastic deformation	0.0%	100.0%
(010)[100]	-1.0%	81.3%
(010)[001]	-1.3%	79.6%
(001)[100]	-1.4%	76.7%
(100)[001]	-1.4%	76.7%
(001)[100], (100)[001]	-1.4%	76.7%
{031}[100]	-1.6%	76.4%
(010)[100], {031}[100]	-1.6%	76.3%
(010)[100], {021}[100]	-2.3%	71.3%
{021}[100], {031}[100], (010)[100]	-2.3%	71.3%
{021}[100], {031}[100]	-2.3%	71.3%
{021}[100]	-2.3%	71.2%
{011}[100], {031}[100]	-3.2%	63.4%
(010)[100], {011}[100]	-3.2%	63.4%
{011}[100], {021}[100]	-3.2%	63.3%
{011}[100]	-3.2%	63.2%
{110}[001], (010)[001]	-3.5%	63.2%
{110}[001]	-3.5%	63.1%
(010)[100], (010)[001]	-3.0%	63.0%
(010)[100], (001)[100]	-3.2%	60.6%
(010)[100], (100)[011]	-3.2%	60.6%
(001)[100], {031}[100]	-3.1%	59.8%
{031}[100], (100)[001]	-3.1%	59.8%
(001)[100], {021}[100]	-3.1%	59.4%
{021}[100], (100)[001]	-3.1%	59.4%
(001)[100], (010)[001]	-3.7%	59.0%
(100)[001], (010)[001]	-3.7%	59.0%
{031}[100], (010)[001]	-3.7%	59.0%
(001)[100], {011}[100]	-3.1%	58.8%
{011}[100], (100)[001]	-3.1%	58.8%
(001)[100], {110}[001]	-3.6%	57.1%
{110}[001], (100)[001]	-3.6%	57.1%
{021}[100], (010)[001]	-4.5%	55.2%
(010)[100], {110}[001]	-5.7%	49.5%
{031}[100], {110}[001]	-5.8%	48.2%
{011}[100], (010)[001]	-6.0%	48.1%
{021}[100], {110}[001]	-5.9%	47.5%
(010)[100], (001)[100], (010)[001]	-6.3%	45.8%
{011}[100], {021}[100], {110}[001]	-6.3%	45.5%
{011}[100], {110}[001]	-6.4%	45.3%
All slip systems	-6.4%	43.1%
Kink system*	-8.7%	35.6%
(010)[100] & Kink system*	-9.1%	33.4%
{031}[100] & Kink system*	-9.2%	32.8%
{021}[100] & Kink system*	-9.2%	32.4%
{011}[100] & Kink system*	-9.6%	31.0%
(001)[100] & Kink system*	-9.7%	30.3%
(100)[001] & Kink system*	-10.0%	28.3%
{110}[001] & Kink system*	-10.3%	26.2%
All slip systems with Kink system*	-10.8%	22.7%

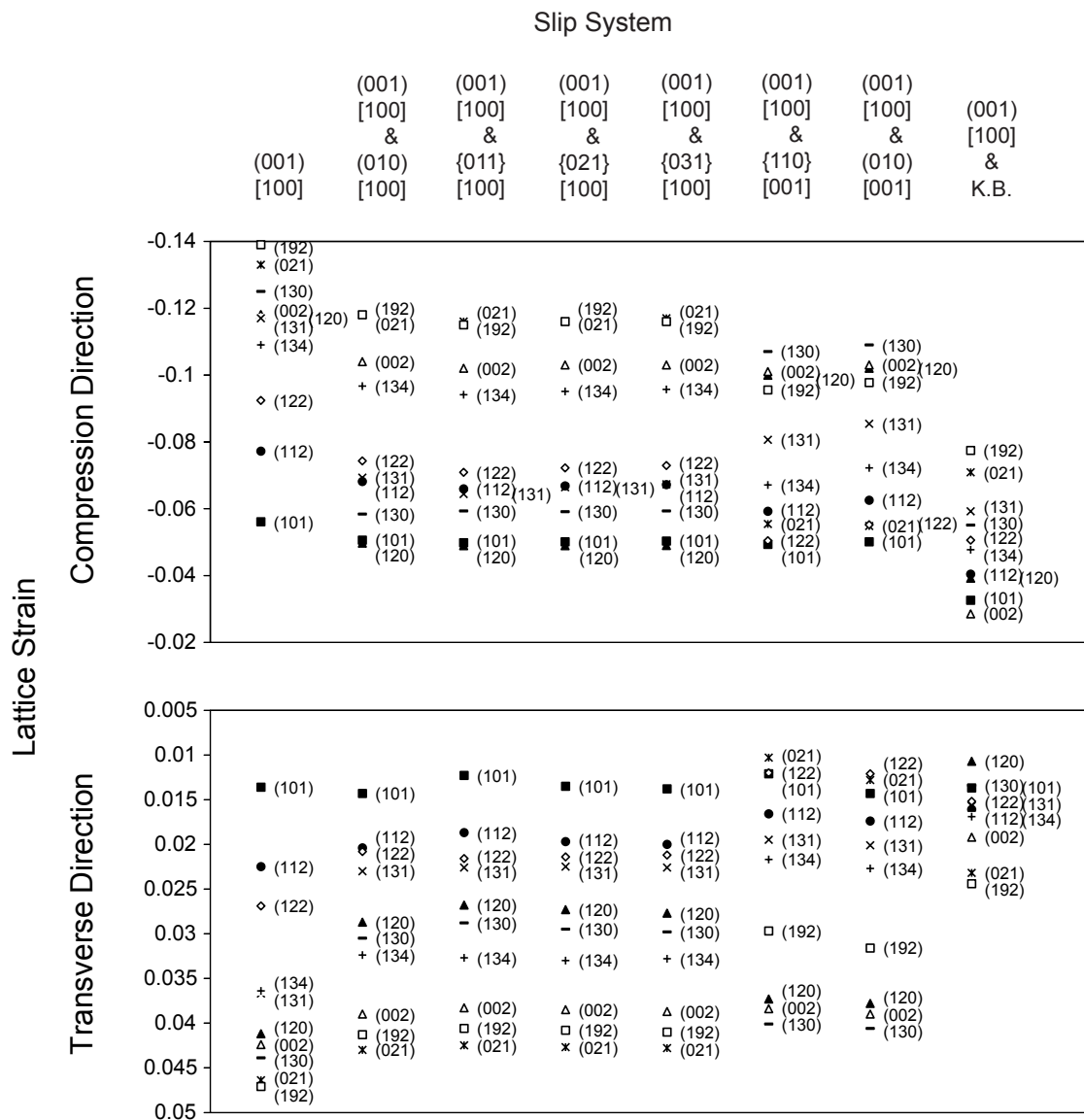
* [-210] on (120), [210] on (1-20), [-504] on (405) and [-50-4](40-5)

Notes: Residual plastic strain is calculated after unloading. Peak macroscopic stress (at a strain of 0.14) is given as a percentage of peak stress for the elastic-only case (19.53 GPa). All simulations were run with $\tau_0 = 1.5$, $\tau_1 = 0.5$, $\phi_0 = 0.01$ and $\phi_1 = 0.01$ for all slip systems as well as the kink band system. Shortening strain is negative.

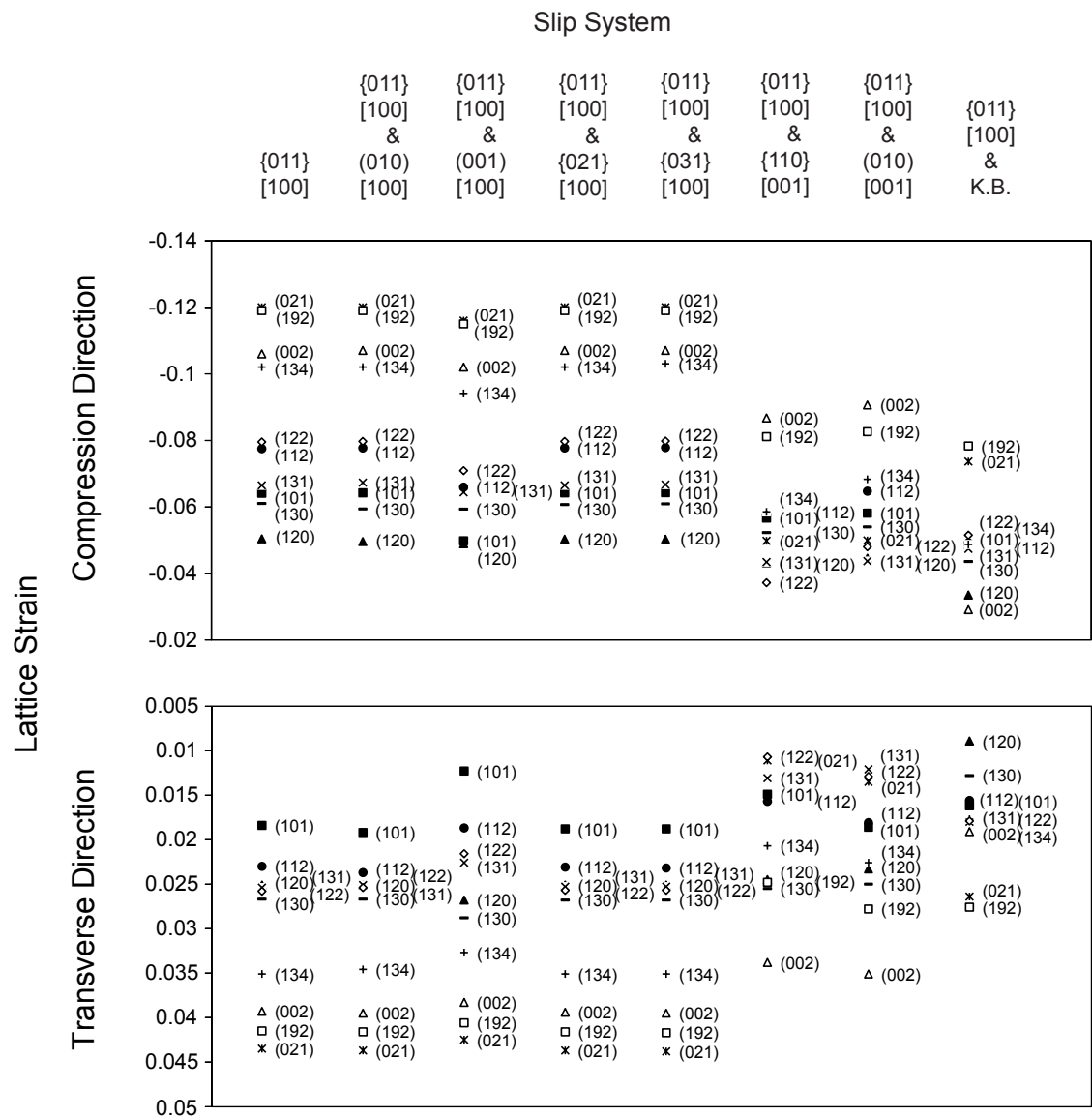


Supplement
Figure 2 (part1)

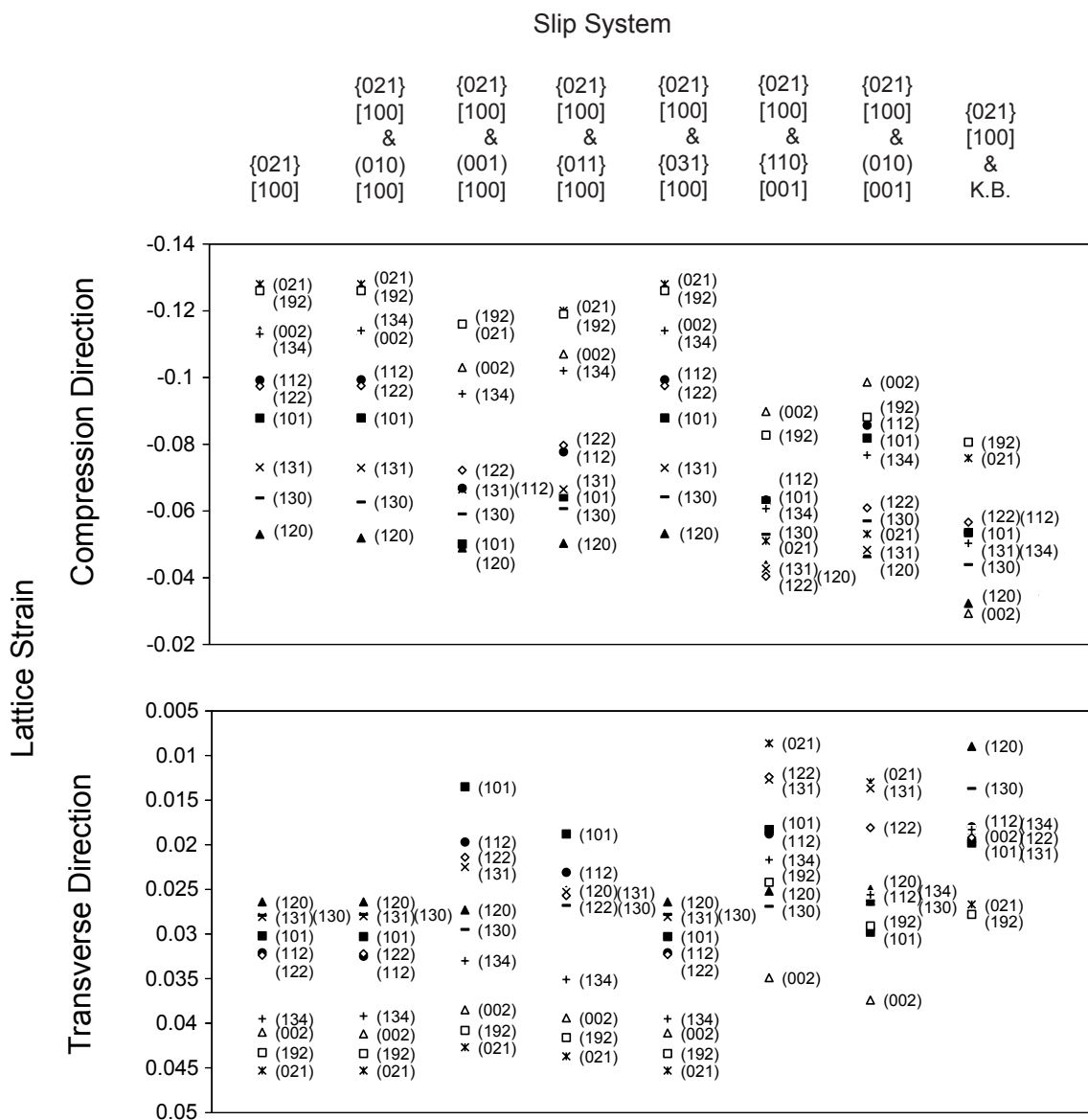
FIGURE S2. Lattice strain at 14% sample strain for EPSC simulations of the operation of pairs of olivine slip systems and the simulation of the kinkband formation. Since the (001)[100] and (100)[001] slip systems have identical Schmidt factors only the results for (001)[100] are plotted.



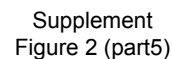
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Figure 2 (part 2)

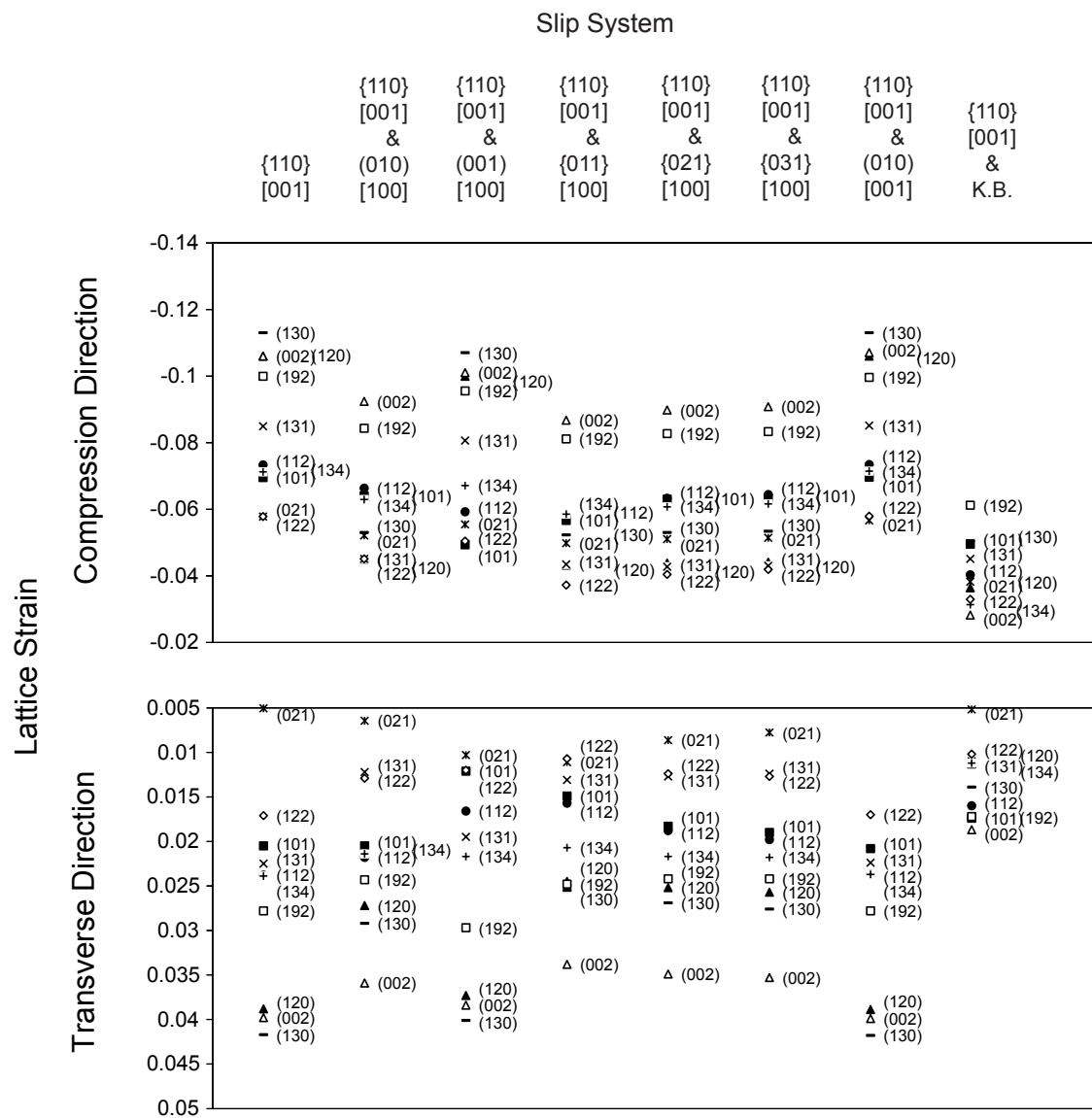


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Figure 2 (part3)

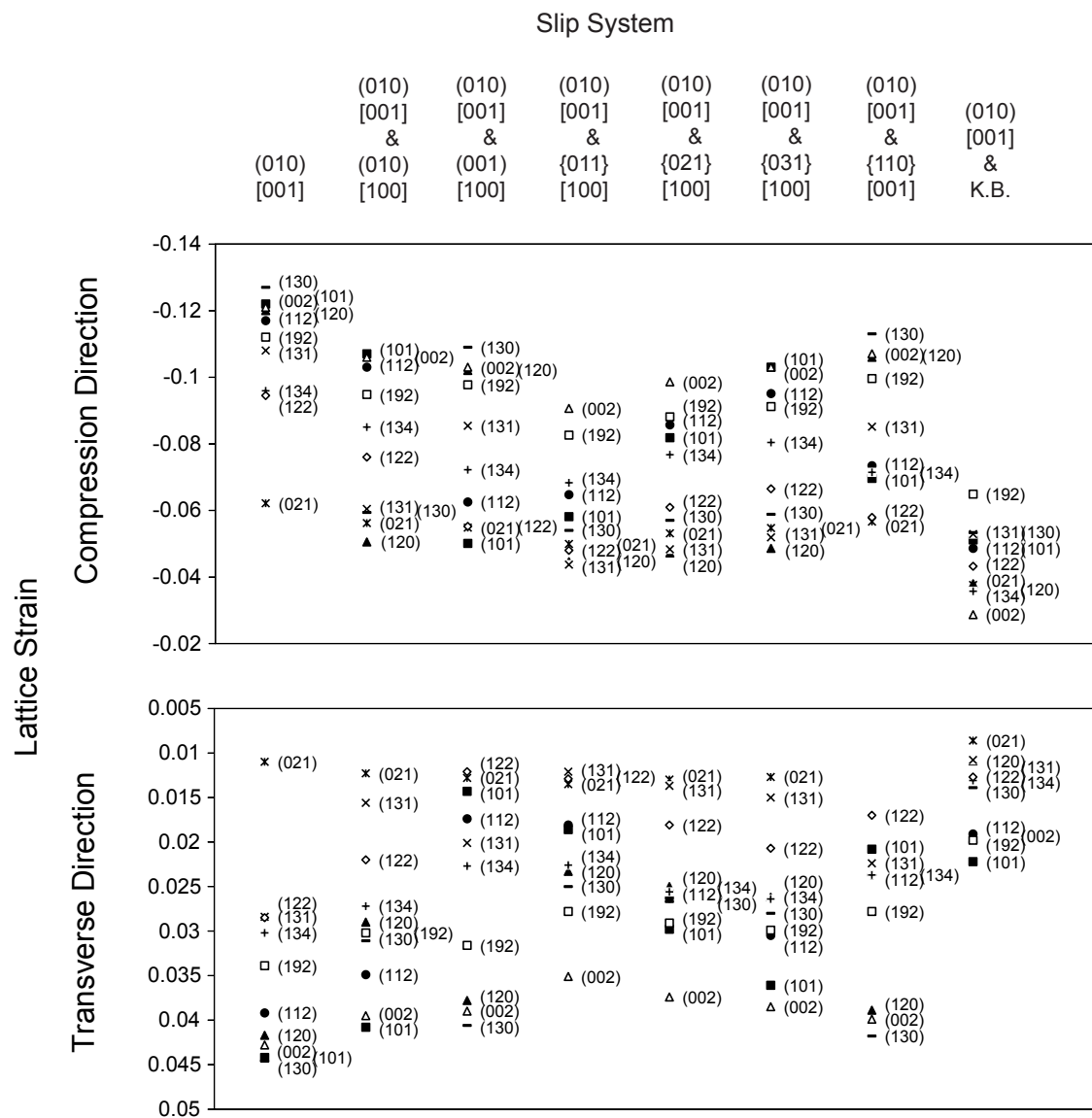


Supplement
Figure 2
(part 4)





Supplement
Figure 2 (part 6)



Supplement
Figure 2 (part 7)

