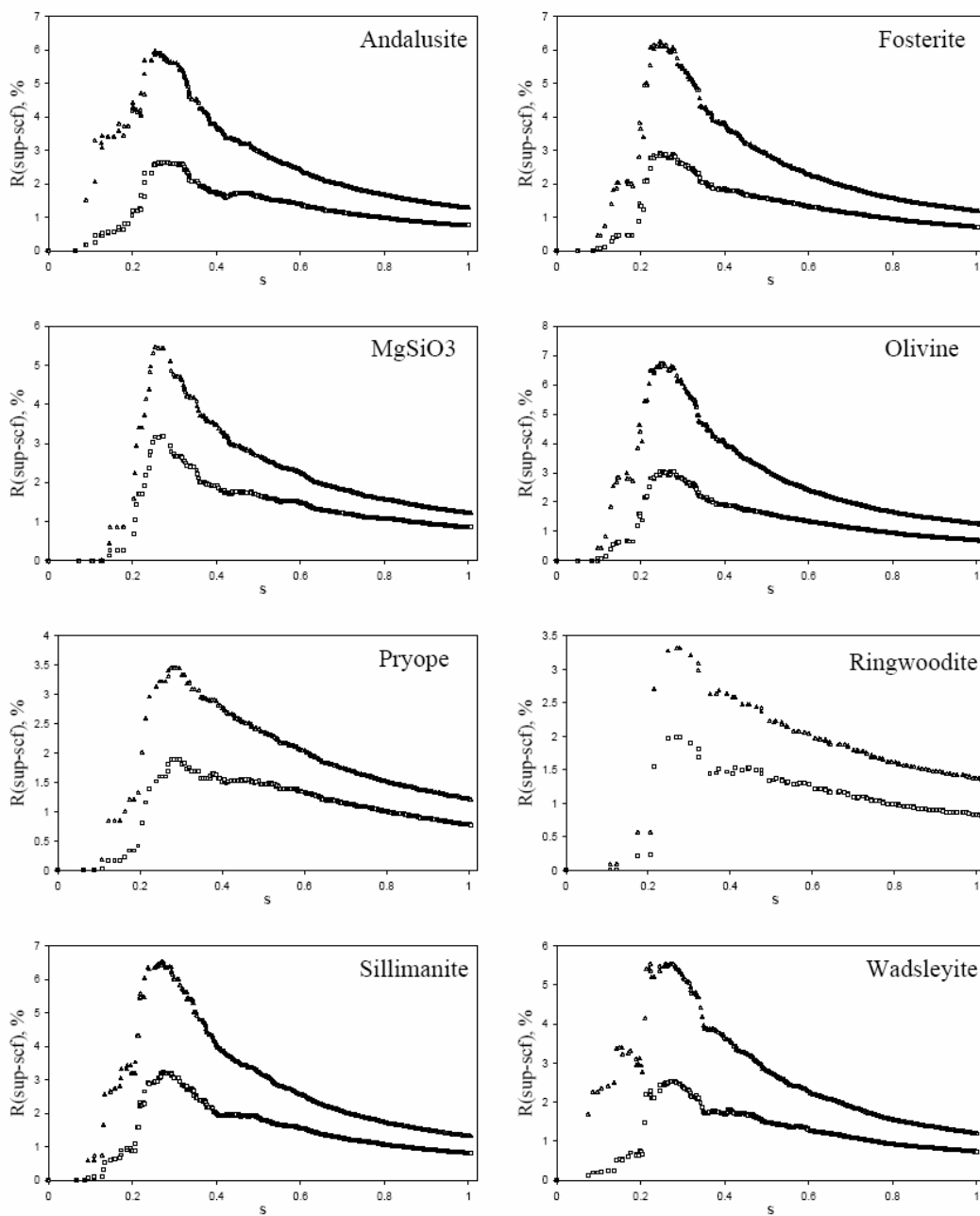


Supplementary Materials

S1. $R(\text{sup-scf})$ for X-ray structure factors(\square) and electron structure factors(\triangle). The unit of s is \AA^{-1} .



S2. Standard deviation (σ) for images and difference images simulated using H9000 parameters.

		$\sigma(\text{fit})$	$\sigma(\text{fit-sup})$ and $\sigma(\text{fit-sup})/\sigma(\text{fit})$	$\sigma(\text{fit-scf})$ and $\sigma(\text{fit-scf})/\sigma(\text{fit})$	$\sigma(\text{sup-scf})$ and $\sigma(\text{sup-scf})/\sigma(\text{fit})$
Al ₂ SiO ₅ (andalusite)	[001]	0.40	0.0028, 0.70%	0.029, 7.3%	0.031, 7.7%
	[010]	0.44	0.0038, 0.86%	0.051, 12%	0.053, 12%
	[100]	0.47	0.0010, 0.22%	0.022, 4.7%	0.022, 4.7%
Mg ₂ SiO ₄ (forsterite)	[001]	0.26	0.0024, 0.94%	0.025, 9.9%	0.026, 10%
	[010]	0.37	0.0035, 0.94%	0.033, 9.0%	0.035, 9.5%
	[100]	0.38	0.0048, 1.3%	0.053, 14%	0.056, 15%
MgSiO ₃ (perovskite)	[001]	0.29	0.0021, 0.71%	0.021, 7.2%	0.023, 7.8%
	[010]	0.28	0.0027, 0.96%	0.039, 14%	0.041, 15%
	[100]	0.31	0.0024, 0.75%	0.020, 6.6%	0.022, 7.3%
Mg ₂ SiO ₄ (olivine)	[001]	0.25	0.0022, 0.89%	0.029, 12%	0.030, 12%
	[010]	0.39	0.0030, 0.76%	0.032, 8.3%	0.034, 8.7%
	[100]	0.38	0.0040, 1.1%	0.050, 13%	0.053, 14%
Al ₂ Mg ₃ Si ₃ O ₁₂ (pyrope)	[001]	0.73	0.0011, 0.15%	0.016, 2.2%	0.016, 2.2%
Mg ₂ SiO ₄ (ringwoodite)	[001]	0.55	0.0031, 0.57%	0.017, 3.2%	0.020, 3.7%
	[001]	0.27	0.0042, 1.6%	0.045, 17%	0.049, 18%
	[010]	0.55	0.0024, 0.43%	0.043, 7.8%	0.044, 8.0%
Al ₂ SiO ₅ (sillimanite)	[010]	0.55	0.0024, 0.43%	0.043, 7.8%	0.044, 8.0%
	[100]	0.35	0.00098, 0.28%	0.0023, 6.5%	0.0023, 6.6%
	[001]	0.58	0.0041, 0.70%	0.021, 3.5%	0.025, 4.2%
Mg ₂ SiO ₄ (wadsleyite)	[010]	0.31	0.0033, 1.1%	0.037, 12%	0.039, 12%
	[100]	0.37	0.0037, 1.0%	0.063, 17%	0.065, 17%

S3. Standard deviation (σ) for images and difference images simulated using JEOL 2200FS-AC(C₅-limited) parameters.

		$\sigma(\text{fit})$	$\sigma(\text{fit-sup})$ and $\sigma(\text{fit-sup})/\sigma(\text{fit})$	$\sigma(\text{fit-scf})$ and $\sigma(\text{fit-scf})/\sigma(\text{fit})$	$\sigma(\text{sup-scf})$ and $\sigma(\text{sup-scf})/\sigma(\text{fit})$
Al ₂ SiO ₅ (andalusite)	[001]	0.49	0.0045, 0.92%	0.042, 8.5%	0.046, 9.3%
	[010]	0.48	0.0046, 0.95%	0.044, 9.2%	0.048, 10%
	[100]	0.57	0.0031, 0.54%	0.029, 5.2%	0.032, 5.6%
Mg ₂ SiO ₄ (forsterite)	[001]	0.39	0.0021, 0.54%	0.022, 5.5%	0.023, 5.7%
	[010]	0.48	0.0040, 0.84%	0.037, 7.6%	0.040, 8.3%
	[100]	0.37	0.0051, 1.4%	0.082, 22%	0.085, 23%
MgSiO ₃ (perovskite)	[001]	0.45	0.0037, 0.82%	0.027, 5.9%	0.030, 6.6%
	[010]	0.70	0.0039, 0.55%	0.033, 4.7%	0.036, 5.1%
	[100]	0.47	0.0040, 0.85%	0.032, 6.7%	0.036, 7.5%
Mg ₂ SiO ₄ (olivine)	[001]	0.39	0.0022, 0.55%	0.023, 5.7%	0.024, 6.0%
	[010]	0.51	0.0046, 0.91%	0.049, 9.6%	0.052, 10%
	[100]	0.35	0.0050, 1.4%	0.081, 23%	0.085, 24%
Al ₂ Mg ₃ Si ₃ O ₁₂ (pyrope)	[001]	0.85	0.0031, 0.37%	0.027, 3.1%	0.027, 3.1%
Mg ₂ SiO ₄ (ringwoodite)	[001]	0.76	0.0039, 0.52%	0.031, 4.0%	0.035, 4.6%
	[001]	0.40	0.0052, 1.3%	0.059, 15%	0.064, 16%
Al ₂ SiO ₅ (sillimanite)	[010]	0.58	0.0051, 0.88%	0.043, 7.4%	0.048, 8.1%
	[100]	0.50	0.0019, 0.37%	0.023, 4.7%	0.025, 5.0%
	[001]	0.75	0.0061, 0.80%	0.031, 4.1%	0.037, 4.9%
Mg ₂ SiO ₄ (wadsleyite)	[010]	0.53	0.0045, 0.86%	0.047, 8.8%	0.050, 9.5%
	[100]	0.90	0.0073, 0.80%	0.097, 11%	0.10, 11%