Supplemental material: Convergence check of calculations

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Convergence for the number of layers

We have checked the layer number dependence of dielectric constants ε_∞ calculated for slab models. Here the results of thicker layer samples are more accurate (namely, close to the bulk systems). The results of the GGA and QSGW calculations are shown in I and II, respectively. From the comparison between seven and nine layers cases, the estimated error seems to be fewer than 1 percent. Thus we have adopted the nine layer cases for all slab models (see the main text).

TABLE I: The dependence of ε_∞ on the number of slab layers in GGA calculations. The bias voltage of the applied field here is 0.2 Ry (see main text).

layer number	LiF	KF	NaCl	MgO	CaO
7	2.0129	1.9434	2.4546	3.0909	3.7612
9	2.0122	1.9401	2.4220	3.0788	3.6801

TABLE II: The dependence of ε_∞ on the number of slab layers in QSGW calculations.

layer number	LiF	KF	NaCl	MgO	CaO
7	1.9413	1.8631	2.3097	2.9321	3.3356
9	1.9387	1.8571	2.3159	2.9172	3.3105

Convergence for bias voltages

We have checked the bias voltage dependence of ε_∞ for slab models. If the bias voltages are in the linear response region, ε_∞ does not depend on the voltages in principle. The results of the GGA and QSGW calculations are shown in III and IV, respectively. From the comparison between 0.1Ry and 0.2Ry cases, the estimated error seems to be fewer than 1 percent. Thus we have adopted the 0.2Ry cases for all slab models (see the main text).

TABLE III: The dependence of ε_∞ on the bias voltage applied to slabs in GGA calculations. The number of the layers is nine (see main text).

layer number	LiF	KF	NaCl	MgO	CaO
0.1	2.0078	1.9355	2.4093	3.07880	3.6690
0.2	2.0122	1.9401	2.4220	3.07882	3.6801

Convergence for the number of k-point meshes for slab models

We have checked the dependence on the number of k-point meshes for slab models. We choose the QSGW calculation on five-layered MgO for example. The constant ε_∞ are 2.939 and 2.951 for $k = 4 \times 4 \times 1$, and $k = 8 \times 8 \times 1$ cases, respectively. From the results, the estimated error seems to be fewer than 1 percent. Thus we have taken $k = 4 \times 4 \times 1$ for all slab models (see the main text).

TABLE IV: The dependence of ε_∞ on the bias voltage applied to slabs in QSGW calculations. The number of the layers is nine (see main text).

layer number	LiF	KF	NaCl	MgO	CaO
0.1	1.9413	1.8631	2.3097	2.9321	3.3356
0.2	1.9387	1.8571	2.3159	2.9172	3.3105

Convergence for the number of k-point meshes for bulk systems

We have checked the dependence on the number of k-point meshes for bulk systems. We choose the QSGW calculation (with local field corrections) on MgO for example. The constant ε_∞ are 2.3714, 2.3696, and 2.3744 for $k = 8 \times 8 \times 8$, $k = 12 \times 12 \times 12$, and $k = 16 \times 16 \times 16$ cases, respectively. From the results, the estimated error seems to be fewer than 1 percent. Thus we have taken $k = 8 \times 8 \times 8$ for all of the materials (see the main text).