Correction to "Basic Theory of Surface Sum-Frequency Generation"

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The definition of $\Delta \vec{k}$ in eq 1 in the paper should be $\Delta \vec{k} = \vec{k} - (\vec{k}_1 + \vec{k}_2)$ instead of $\Delta \vec{k} = (\vec{k}_1 + \vec{k}_2) - \vec{k}$. There is also a mistake in the paper inherited from a previous publication (ref 20): Derivation of eqs 1, 14, and 15, involves an integration of the bulk sum-frequency response, $\vec{P}_{\mathrm{B}}^{(2)}(\omega, z)\, \mathrm{d}z$ or $\overleftrightarrow{\chi}_{\mathrm{B}}^{(2)}(\omega, z)\, \mathrm{d}z$, over medium II from $z = 0^-$ to ∞. The integration, properly done, should yield an effective surface susceptibility given by

$$\overleftrightarrow{\chi}_{\mathrm{S,eff}}^{(2)} \equiv \overleftrightarrow{\chi}_{\mathrm{SS}}^{(2)} + \frac{\overleftrightarrow{\chi}_{\mathrm{B}}^{(2)}(\vec{k} \neq \vec{k}_1 + \vec{k}_2)}{i\Delta k_z^{\mathrm{II}}}$$

$$= \overleftrightarrow{\chi}_{\mathrm{S}}^{(2)} + \frac{\overleftrightarrow{\chi}_{\mathrm{BB}}^{(2)}(\vec{k} = \vec{k}_1 + \vec{k}_2)}{i\Delta k_z^{\mathrm{II}}}$$

instead of eq 20 in the paper, where $\overleftrightarrow{\chi}_{\mathrm{B}}^{(2)}$, $\overleftrightarrow{\chi}_{\mathrm{BB}}^{(2)}$, $\overleftrightarrow{\chi}_{\mathrm{S}}^{(2)}$, and $\overleftrightarrow{\chi}_{\mathrm{SS}}^{(2)}$ are defined by eqs 16 and 17 in the paper. The conclusion in the paper must be revised accordingly. We can separately deduce $\overleftrightarrow{\chi}_{\mathrm{S}}^{(2)}$ and $\overleftrightarrow{\chi}_{\mathrm{BB}}^{(2)}$ from measurement, but we have $\overleftrightarrow{\chi}_{\mathrm{S}}^{(2)} \equiv \overleftrightarrow{\chi}_{\mathrm{SS}}^{(2)} - \overleftrightarrow{\chi}_{\mathrm{BS}}^{(2)}$, where $\overleftrightarrow{\chi}_{\mathrm{BS}}^{(2)} \equiv \overleftrightarrow{\chi}_q^{(2)}\hat{z}$ in the paper is from the bulk-like electric-quadrupole contribution, intrinsically inseparable from $\overleftrightarrow{\chi}_{\mathrm{SS}}^{(2)}$. The inseparability originates from well-known nonuniqueness in defining multipole expansion of a polarization (eq 5 in the paper), first pointed out previously in ref 31 of the paper.