Derivation of $C_6$-coefficients from B3LYP calculations of the long-range parts of the Si($^3P_J$) + O$_2$($^3Σ_g^-$) potential energy surface.

**Figure S1:** Long-range part of the singlet PES at the B3LYP/6-311+G(2d,p) level of theory. The optimization was carried out on a grid of 16 values of the Si-X distance $r$ ranging from 4 to 7 Å, and 13 values of the Jacobi angle $θ$ ranging from 0 to 90°.

**Figure S2:** A $C_6 \times r^{-6}$ potential was fitted to the PES and $C_6$ values were obtained for the range of Jacobi angles (0 – 90°). For $θ > 67.5°$ departure from $r^{-6}$ behaviour was observed for $r > 6$ Å and therefore only values of $r$ between 4 and 6 Å were considered in the fit.
Figure S3: $C_6$ coefficients as a function of the Jacobi angle. The angle-averaged $C_6$ is $3.9 \times 10^{-54}$ J m$^6$ molecule$^{-1}$, which agrees reasonably well with the value calculated with the London formula ($6.0 \times 10^{-54}$ J m$^6$ molecule$^{-1}$). The maximum variation of ~40% with respect to the averaged $C_6$ indicates that there is not a very strong dependence on the Jacobi angle.