Supplementary Information


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Figure SI-1. Transient absorption spectra of Ph₂Ge-amine complexes in hexane solution at 23 °C. The spectra were recorded 2.8-3.1 µs, 1.65-1.78 µs, and 4.4-5.1 µs after the laser pulse for solutions containing 0.13 mM n-BuNH₂ (black), 0.66 mM Et₂NH (blue), and 5.0 mM Et₃N (red), respectively. The species decayed with mixed order kinetics under these conditions, with lifetimes of 50-200 µs.

Figure SI-2. Plot of (ΔA₅₀₀₀ - ΔA₅₀₀,res)/(ΔA₅₀₀,res) (“span/plateau”) vs. [isoprene] in hexane solution at 23 °C (see Eqn. 7 in the paper). The ΔA₅₀₀₀ and ΔA₅₀₀,res used are the best-fit values of the initial and residual transient absorbances from non-linear least squares analysis of the ΔA₅₀₀ vs. time data of Figure 5(a) to a single exponential decay.

Figure SI-3. Reversible scavenging of Ph₂Ge by 4,4-dimethyl-1-pentene (DMP). Raw transient growth/decay profiles recorded at (a) 500 nm and (b) 440 nm on the same time scale in the presence of DMP at the concentrations listed in (a); (c) 440 nm data from a different experiment, recorded over a longer time scale; (d) the data of (a) after subtraction of the data from (b) scaled by 0.15, and fit to a single exponential decay.

Figure SI-4. (a) plots of k_decay (from Fig. SI-3d) and ΔA₄₄₀₀₀/ΔA₄₄₀,Q (from Fig. SI-3c) vs [Q]; (b) plot of span/plateau values vs. [DMP], from the fits of the data in Fig. SI-3d.

Figure SI-5. Kinetic simulations of reversible scavenging for k_Q = 5 x 10⁹ M⁻¹s⁻¹ and K_eq = 5000 M⁻¹: (a) germylene decay profiles; (b) digermene growth/decay curves; (c) plots of k_decay vs [Q] and ΔA_digerm,₀/ΔA_digerm,Q vs [Q], where the (germylene) k_decay values were determined by non-linear least squares fitting of the simulated data of (a) to a single exponential decay and ΔA_digerm values are the maxima in the digermene growth/decay curves of (b); (d) plot of span/plateau values vs. [IP], from the fits of the data in (a).

Figure SI-6. Transient absorption spectra and decay profiles of the transient products from reaction of Ph₂Ge with (a) 4,4-dimethyl-1-pentene (DMP; 100 mM) and (b) 3,3-dimethyl-1-butyne (TBE; 2.5 mM) in deoxygenated hexane solution at 23 °C.
Figure SI-7. 600 MHz $^1$H NMR spectra of product mixtures from steady state photolyses of 1a (0.05 M) in deoxygenated C$_6$D$_{12}$ solution containing (a) 0.05 M DMP and (b) 0.05 M TBE.
Figure SI-1. Transient absorption spectra of Ph$_2$Ge-amine complexes in hexane solution at 23 °C. The spectra were recorded 2.8-3.1 µs, 1.65-1.78 µs, and 4.4-5.1 µs after the laser pulse for deoxygenated solutions containing 0.003 M 1a and 0.13 mM n-BuNH$_2$ (black), 0.66 mM Et$_2$NH (blue), and 5.0 mM Et$_3$N (red), respectively. The species decayed with mixed order kinetics under these conditions, with lifetimes of 50-200 µs. The band at 440 nm in the spectrum of the Ph$_2$Ge-NEt$_3$ complex is due to tetraphenyldigermene (2a).
Figure SI-2. Plot of \((\Delta A_{500,0} - \Delta A_{500,\text{res}})/(\Delta A_{500,\text{res}})\) (“span/plateau”) vs. [isoprene] in hexane solution at 23 °C (see Eqn. 7 in the paper). The \(\Delta A_{500,0}\) and \(\Delta A_{500,\text{res}}\) used are the best-fit values of the initial and residual transient absorbances from non-linear least squares analysis of the \(\Delta A_{500}\) vs. time data of Figure 5(a) to a single exponential decay.
Figure SI-3. Reversible scavenging of Ph₂Ge by 4,4-dimethyl-1-pentene (DMP). Raw transient growth/decay profiles recorded at (a) 500 nm and (b) 440 nm on the same time scale in the presence of DMP at the concentrations listed in (a); (c) 440 nm data from a different experiment, recorded over a longer time scale; (d) the data of (a) after subtraction of the data from (b) scaled by 0.15, and fit to a single exponential decay.
**Figure SI-4.** (a) Plots of $k_{\text{decay}}$ (from Fig. SI-3d) and $\Delta A_{440,0}/\Delta A_{440,Q}$ (from Fig. SI-3c) vs [Q]; (b) plot of span/plateau values vs. [DMP], from the fits of the data in Fig. SI-3d.
Figure SI-5. Simulation of (a) germylene decay profiles and (b) digermene growth/decay curves for reversible germylene scavenging according to the following scheme:

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\begin{align*}
2\text{Ph}_2\text{Ge} & \xrightarrow{k_{\text{dim}}} \text{Ph}_2\text{Ge}=\text{GePh}_2 (2a) \quad k_{\text{dim}} = 2 \times 10^{10} \text{M}^{-1}\text{s}^{-1}; [\text{Ph}_2\text{Ge}]_0 = 1 \times 10^{-5} \text{M} \\
\text{Ph}_2\text{Ge} + Q & \xrightarrow{k_Q} P_{\text{GeQ}} \quad k_Q = 5 \times 10^9 \text{M}^{-1}\text{s}^{-1}; k_Q = 1 \times 10^6 \text{s}^{-1} \\
2a + 2a & \xrightarrow{k_{\text{dim}}'} \text{Ge-oligomer} \quad (K_{\text{eq}} = 5000) \\
2a + Q & \xrightarrow{k_{Q}'} P_{\text{Ge2Q}} \quad k_{Q}' = 2 \times 10^6 \text{M}^{-1}\text{s}^{-1}
\end{align*}
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Fitting each set of the simulated data of (a) to a first-order exponential decay (as with the experimental data) returns the decay rate constants plotted in (c); the slope agrees well with the original \(k_Q\) value used in the simulation. Figure (d) shows a plot of the \(\text{span/plateau}\) values returned by the fits of the decay data in (a); again, the slope agrees well with the original \(K_{\text{eq}}\) value used in the simulation.
Figure SI-6. Transient absorption spectra of the transient products from reaction of Ph₂Ge with (a) 4,4-dimethyl-1-pentene (DMP) and (b) 3,3-dimethyl-1-butyne (TBE). The spectra were recorded by laser flash photolysis of deoxygenated 0.003 M hexane solutions of 1a in the presence of 100 mM and 2.5 mM DMP and TBE, respectively. The Insets show representative decay traces recorded at or near the absorption maxima, using neutral density filters to reduce the laser intensity; the solid lines represent the best fits of the data to a first order exponential decay.
Figure S1-7. (a) 600 MHz $^1$H NMR spectra of product mixtures from steady state photolyses of 1a (0.05 M) in deoxygenated C$_6$D$_{12}$ solution containing 0.05 M DMP before and after 15 minutes photolysis with 6 RPR-2537 lamps.
Figure SI-7. (b) 600 MHz $^1$H NMR spectra of product mixtures from steady state photolyses of 1a (0.05 M) in deoxygenated C$_6$D$_{12}$ solution containing 0.05 M TBE before and after 15 minutes photolysis with 6 RPR-2537 lamps. The peak labeled “Product 1” in the second spectrum is due to the primary product of the reaction, while that labeled “Product 2” is a secondary product. A peak tentatively assigned to a third relatively minor product is also labeled.