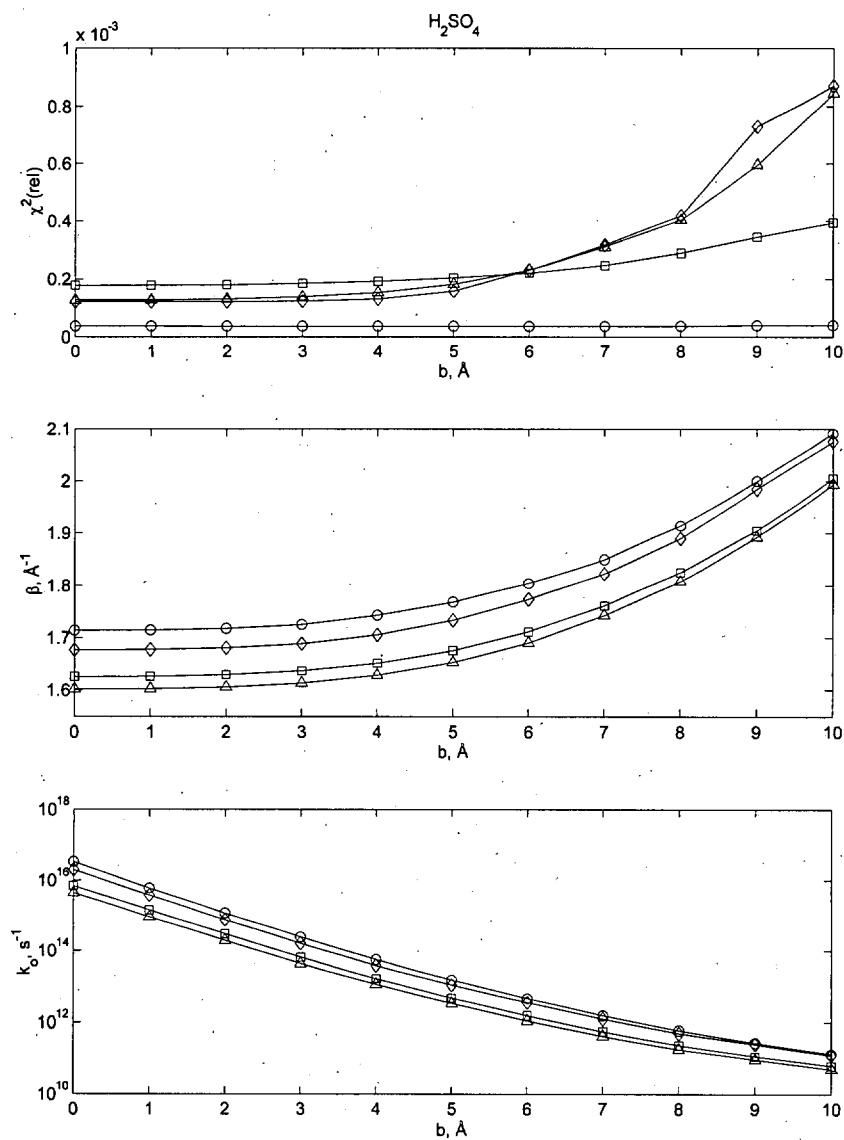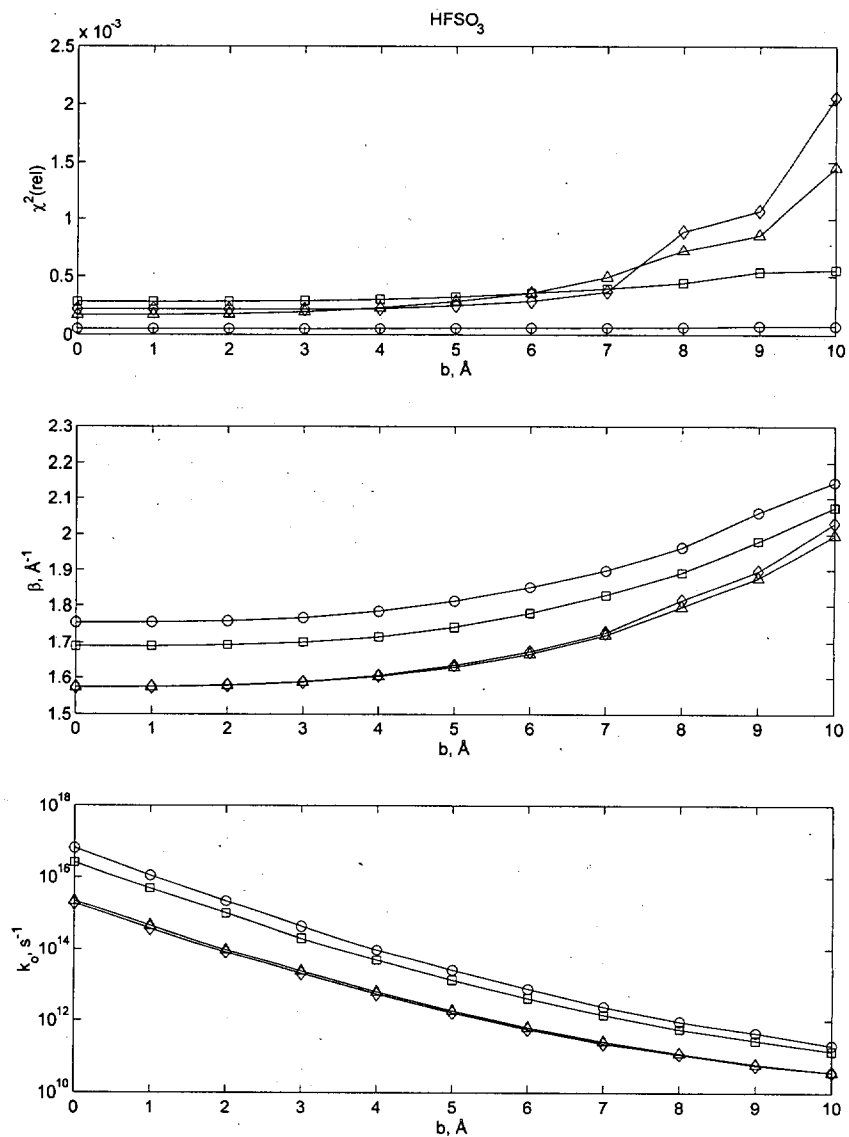**Figure S1.** Dependences of χ_{rel}^2 (upper), best-fit β, and best-fit k_o (eq. 2) on the excluded volume parameter b for $*Ru(tpy)_2^{2+}$ quenching by $Fe(OH_2)_6^{3+}$ in 25% v/v H_2SO_4 at 77 K.
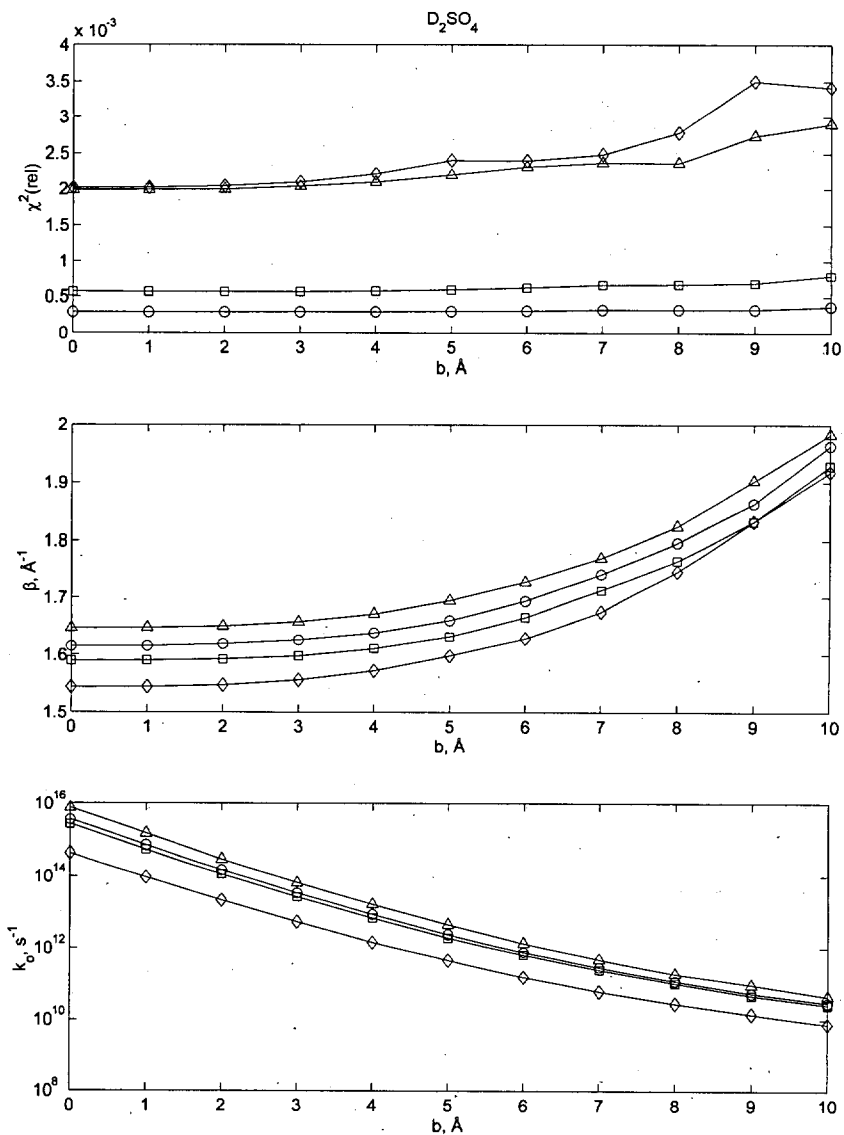
Figure S2. Dependences of χ_{rel}^2 (upper), best-fit β, and best-fit k_o (eq. 2) on the excluded volume parameter b for *$Ru(tpy)_2^{2+}$ quenching by $Fe(OH_2)_6^{3+}$ in 25% v/v $HFSO_3$ at 77 K.

Figure S3. Dependences of χ_{rel}^2 (upper), best-fit β, and best-fit k_o (eq. 2) on the excluded

volume parameter b for *Ru(tpy)$_2^{2+}$ quenching by Fe(OH$_2$)$_6^{3+}$ in 25% v/v D$_2$SO$_4$ at 77 K.

Figure S4. Luminescence decay kinetics for $Ru(tpy)_2^{2+}$ in a $HFSO_3/H_2O$ glass (77 K) in the presence of $Fe(OH_2)_6^{3+}$ (upper to lower traces: 0.0, 0.05, 0.10, 0.25, 0.50 M). Dots correspond to calculated decays using eq. 1 and the parameters listed in Table 1.
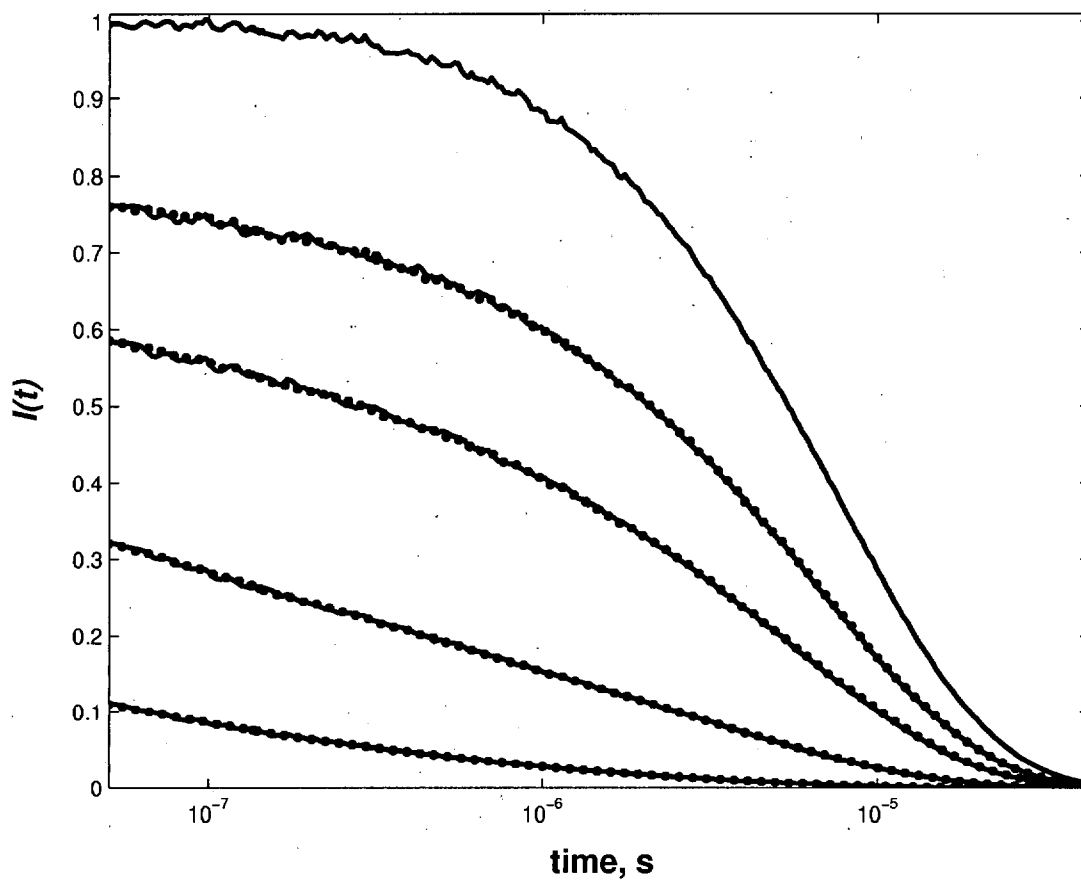
Figure S5. Luminescence decay kinetics for $Ru(tpy)_2^{2+}$ in a D_2SO_4/H_2O glass (77 K) in the presence of $Fe(OH_2)_6^{3+}$ (upper to lower traces: 0.0, 0.05, 0.10, 0.25, 0.50 M). Dots correspond to calculated decays using eq. 1 and the parameters listed in Table 1.