Supporting Information

A. Measurement of Fluorescent spectra

Fluorescence emission spectra of vancomycin-1-pyrenemethyl amide (**2**) were recorded using PerkinElmer instruments LS 55 Luminescence spectrometer with excitation at 333 nm, detection range from 350 nm to 610 nm, and slit width of 4.0 nm . Sodium phosphate buffer was prepared according to Current Protocols in Protein Science, Volume 2.[1] The emission spectra of **2** on VRE were carried out by adhering the wet VRE cells on a quartz slide.

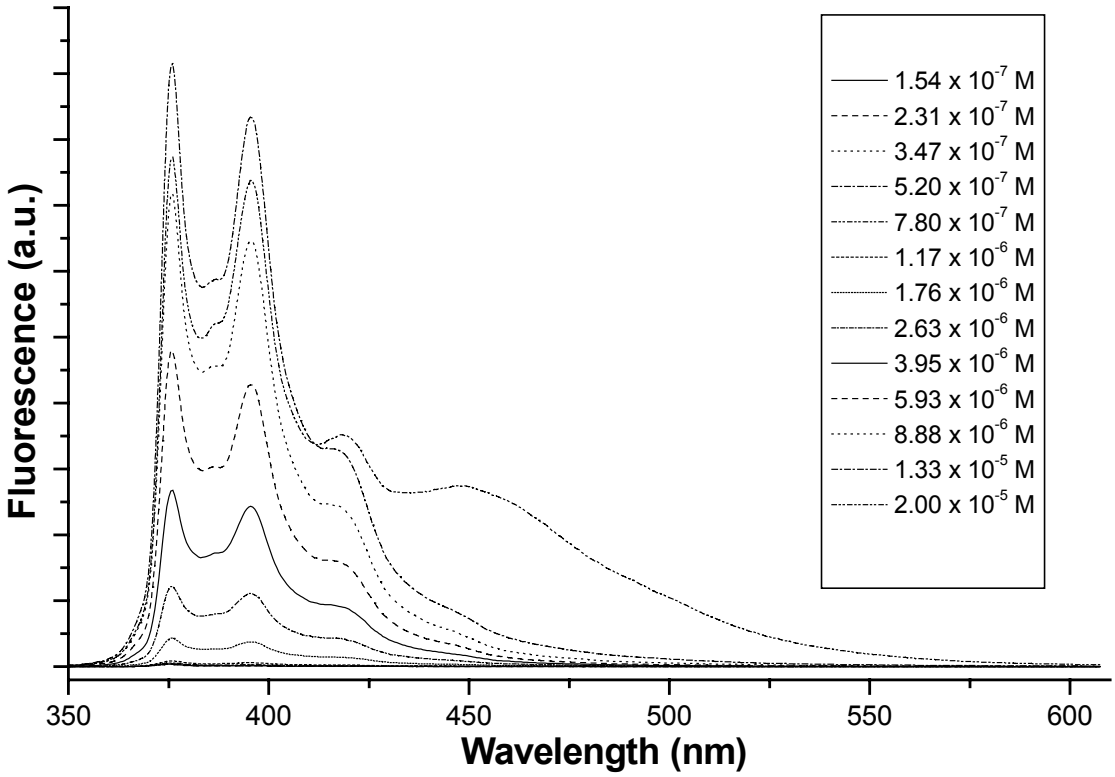

Figure 1. Emission spectra of **2** in deionized water.

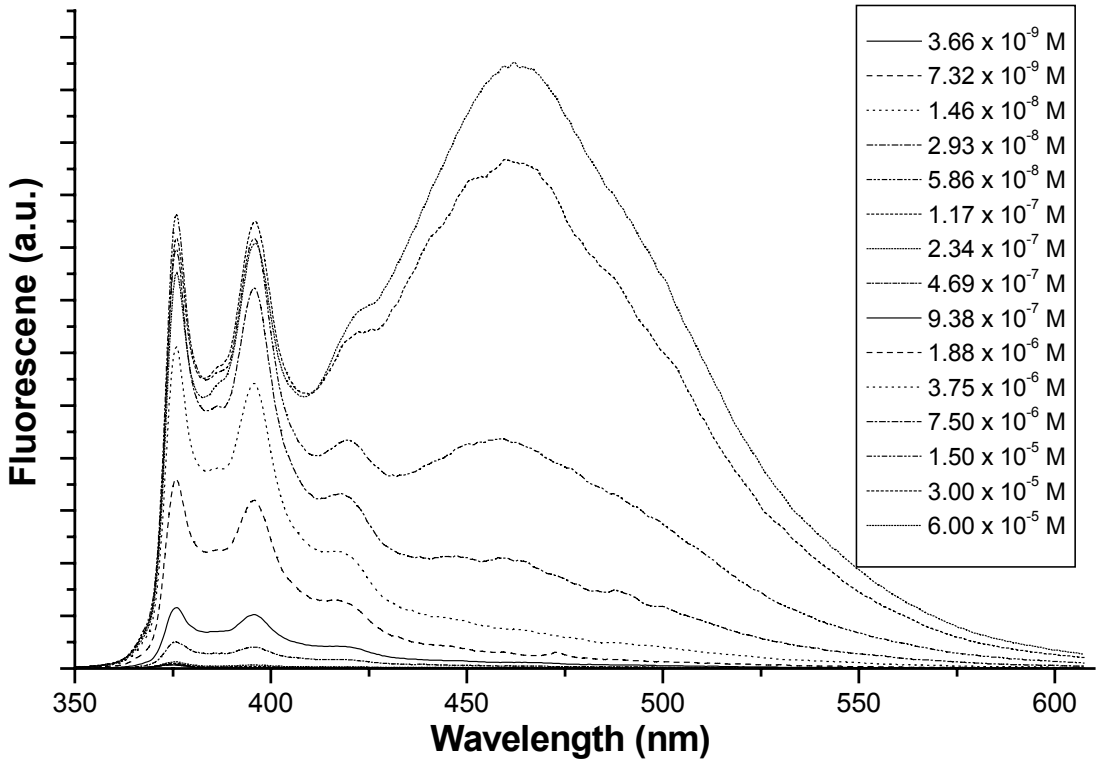

Figure 2. Emission spectra of **2** in phosphate buffer ($[Na_2HPO_4]$ = 1.0 mM, pH = 9.02).

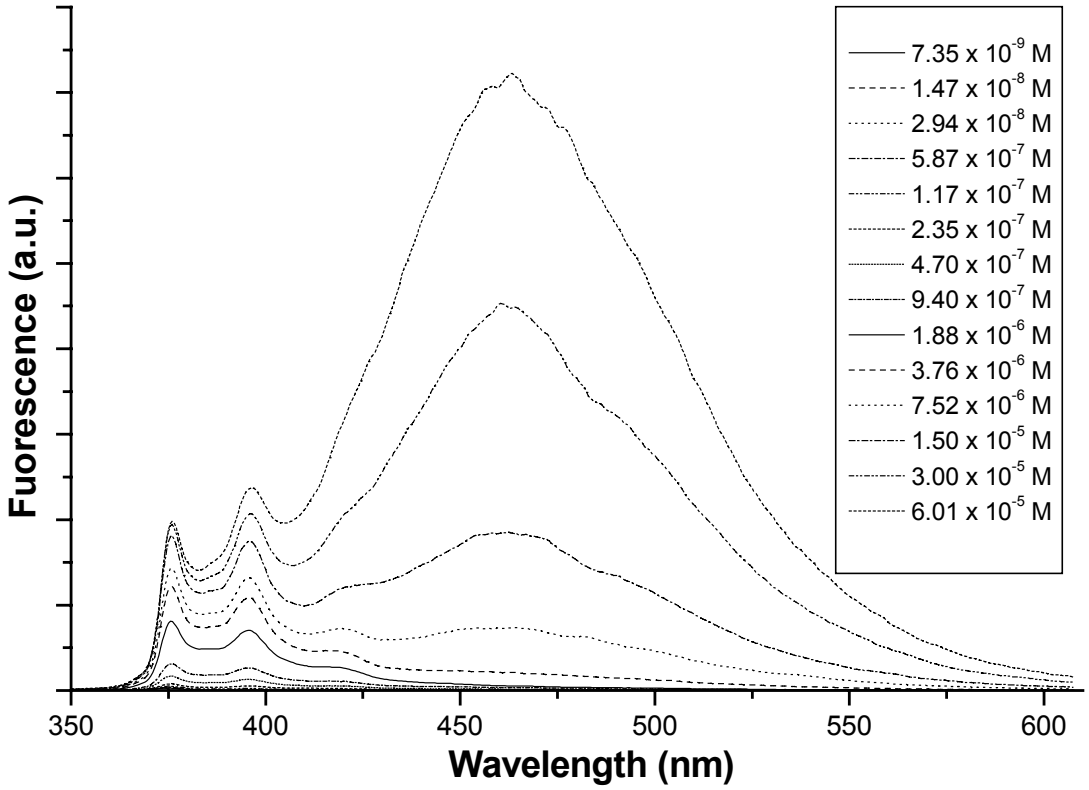

Figure 3. Emission spectra of **2** in phosphate buffer ([Na_2HPO_4] = 10.0 mM, pH = 9.18).

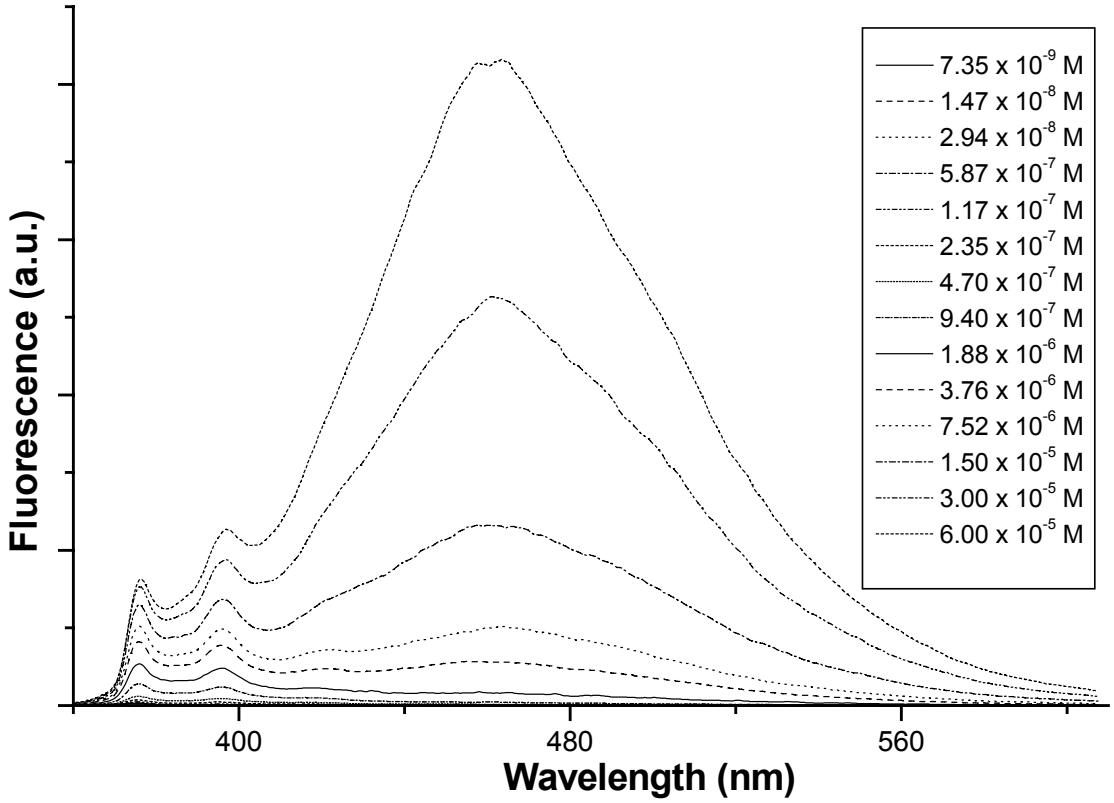

Figure 4. Emission spectra of **2** in phosphate buffer ([Na_2HPO_4] = 0.1 M, pH = 9.20).

B. Calculation of dimerization constants

We used the procedure established by Jones et. al.[2] to determine the dimerization constant of **2** in the phosphate buffer. Figure 5 shows the dimerization constant is proportional to the square root of the phosphate concentration, which follows the Debye-Huckel theory.

According to the theory, when [Na_2HPO_4] ≤ 0.1 M and at the equilibrium of the dimerization of **2**, the real dimerization constant K is,

$$K = \frac{a_3}{a_2^2} = \frac{[3]\gamma_3}{[2]^2\gamma_2^2}$$

so the observed dimerization constant, $K_{obs} = K\frac{\gamma_2^2}{\gamma_3}$, where $\gamma_j = e^{-\frac{Z_j^2 e^2 \mathrm{K}}{2\varepsilon kT}}$

therefore, $$\frac{\gamma_2^2}{\gamma_3} = \frac{e^{-\frac{Z_2^2 e^2 \mathrm{K}}{2\varepsilon kT}}}{e^{-\frac{Z_3^2 e^2 \mathrm{K}}{2\varepsilon kT}}} = \frac{e^{-\frac{Z_2^2 e^2 \mathrm{K}}{2\varepsilon kT}}}{e^{-\frac{4Z_2^2 e^2 \mathrm{K}}{2\varepsilon kT}}} = e^{\frac{2Z_2^2 e^2 \mathrm{K}}{2\varepsilon kT}} = e^{\frac{Z_2^2 e^2 \mathrm{K}}{\varepsilon kT}} = 1 + \frac{Z_2^2 e^2 \mathrm{K}}{\varepsilon kT}$$

So, $$K_{obs} = K(1 + \frac{Z_2^2 e^2 \mathrm{K}}{\varepsilon kT})$$

Since $K^2 = \frac{4\pi e^2}{\varepsilon kT}\sum_i \rho_i Z_i^2$,

therefore for [Na_2HPO_4], $K^2 = \frac{4\pi e^2}{\varepsilon kT}(2\times 1^2 + 1\times 2^2)[Na_2HPO_4]$

So, $K_{obs} = K(1 + \frac{Z_2^2 e^2 \sqrt{\frac{4\pi e^2}{\varepsilon kT}(2\times 1^2 + 1\times 2^2)[Na_2HPO_4]}}{\varepsilon kT})$, which is consistent with experimental result.

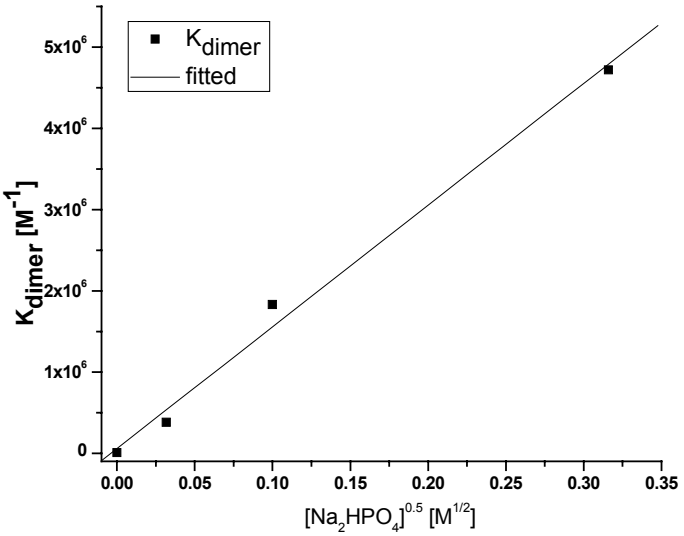

Figure 5. Phosphates concentration dependence of dimerization constants (K_{dimer}).

B. In vitro test

Table 1 The minimum concentration of the Van and Van-pyrene required to inhibit growth of bacterial cells (the genotype of the strains confirmed by PCR) was measured in Muller-Hinton broth with different concentration of Na_2HPO_4.

PCR ID	Gene	MIC (mg/mL)					
		1 mM/ Na_2HPO_4		10 mM/ Na_2HPO_4		10 mM/ Na_2HPO_4	
		1	**2**	**1**	**2**	**1**	**2**
E. GALL	C	8	2	8	2	8	2
E faecium	B	64	0.5	32	0.5	32	0.5
E faecium	B	32	1	32	1	32	1
E faecium	B	32	1	32	1	32	1
E faecium	B	128	1	128	1	64	1
E faecium	B	128	1	128	0.5	128	0.5
E. faecalis	A	>128	1	>128	1	>128	1
E faecium	A	>128	2	>128	2	>128	1
E faecium	A	>128	4	>128	4	>128	4
E. faecalis	A	>128	4	>128	4	>128	4
ATTC2912		2	2	2	2	2	2

Reference:
1) J. E. Coligan, B. M. Dunn, H. L. Ploegh, D. W. Speicher, P. T. Wingfield, *Current Protocols in Protein Science, Vol. 2*, 1995.
2) Jones, G.; Vullev, V. I. *Org. Lett.* **2001**, *3*, 2457-2460.