

Supplementary Material

For

**Drug-inclusive inorganic-organic hybrid systems for the controlled
release of the osteoporosis drug zoledronate**

By

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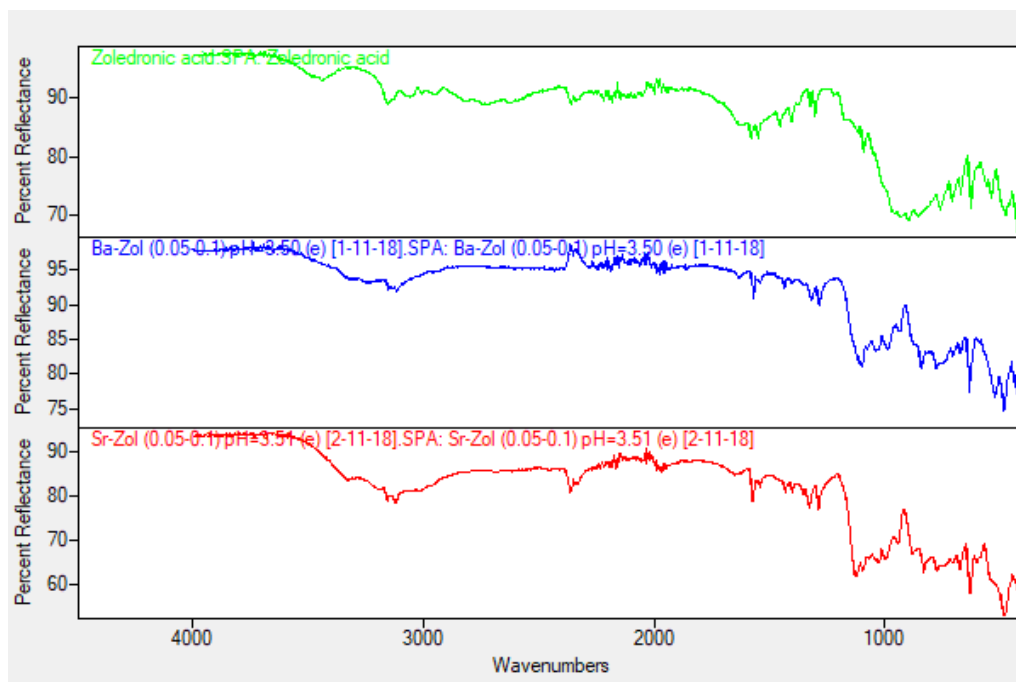


Figure S1. ATR-IR spectra of zoledronic acid (green), Ba-ZOL (blue), and Sr-ZOL (red).

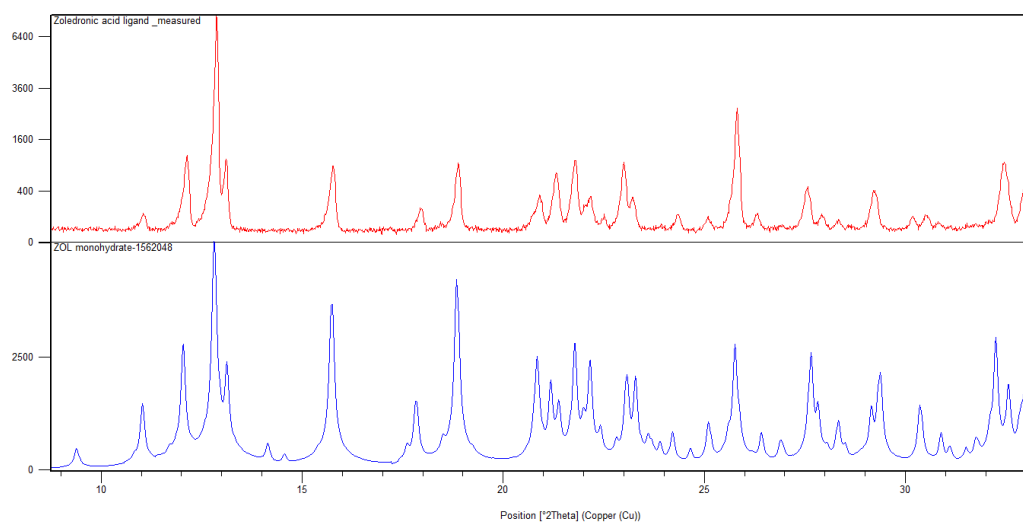


Figure S2. Comparison of the calculated (lower, blue) and measured (upper, red) X-ray diffraction diagrams of zoledronic acid monohydrate.

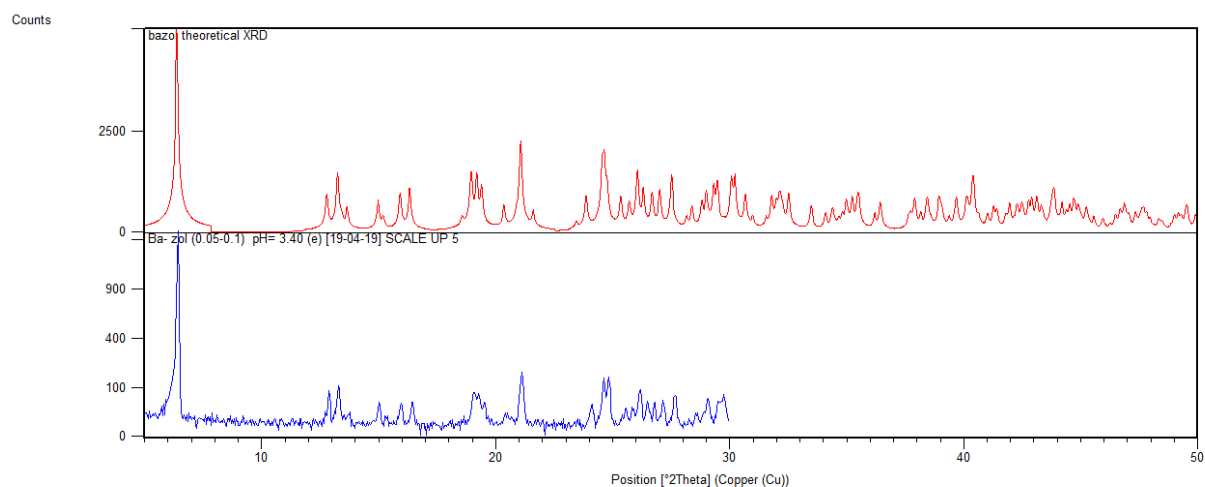


Figure S3. Comparison of the calculated (upper, red) and measured (lower, blue) X-ray diffraction diagrams of Ba-ZOL.

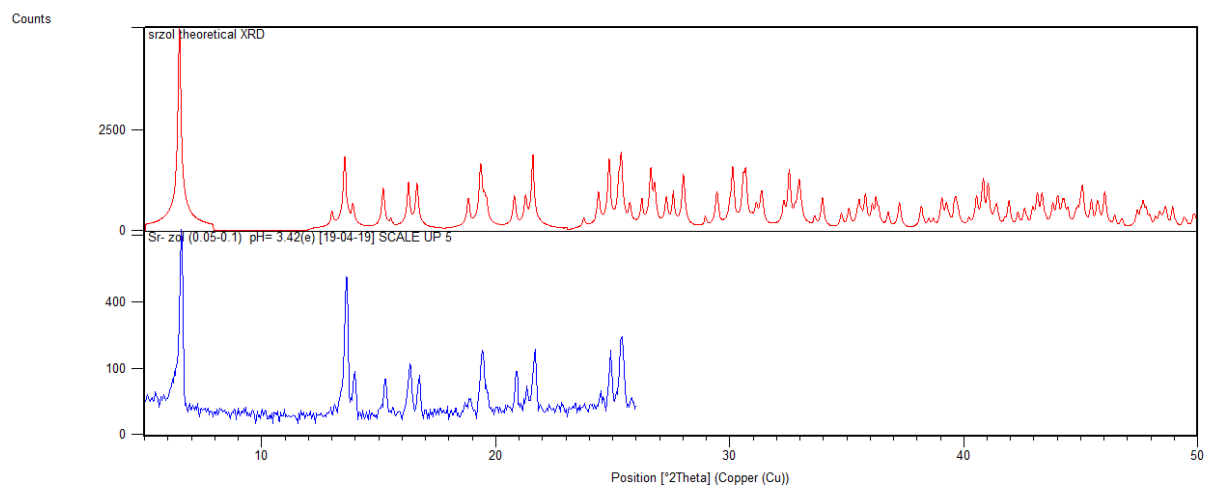


Figure S4. Comparison of the calculated (upper, red) and measured (lower, blue) X-ray diffraction diagrams of Sr-ZOL.

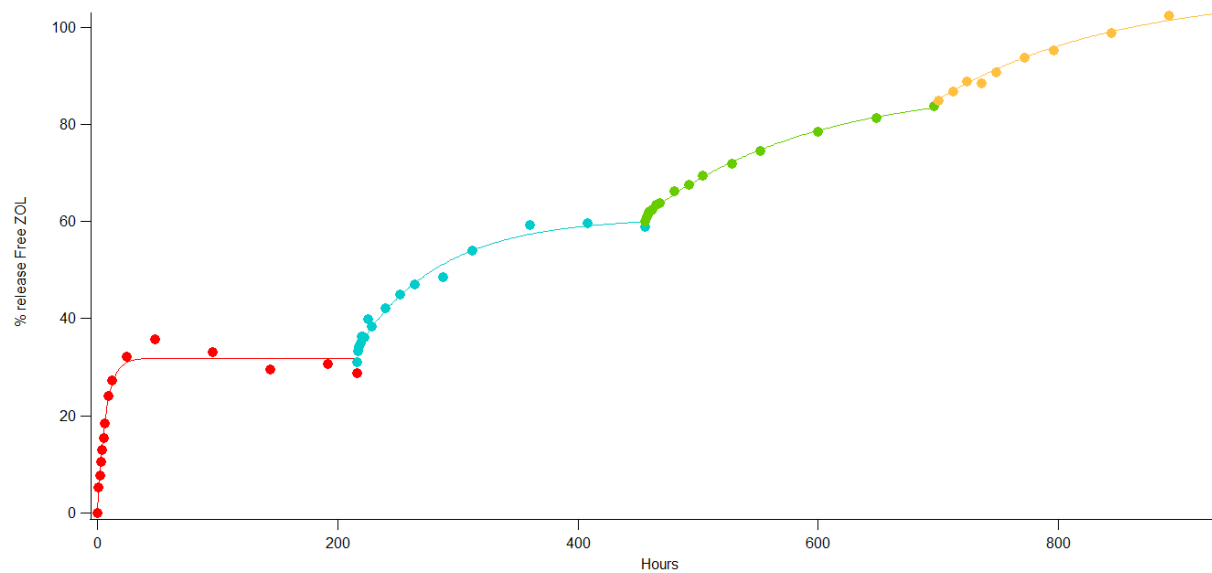
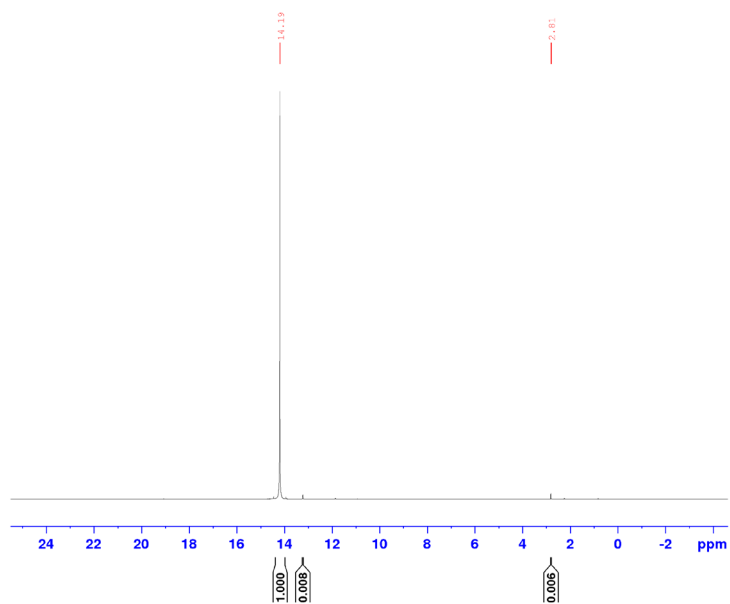
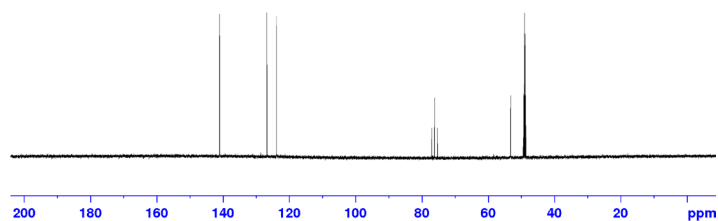
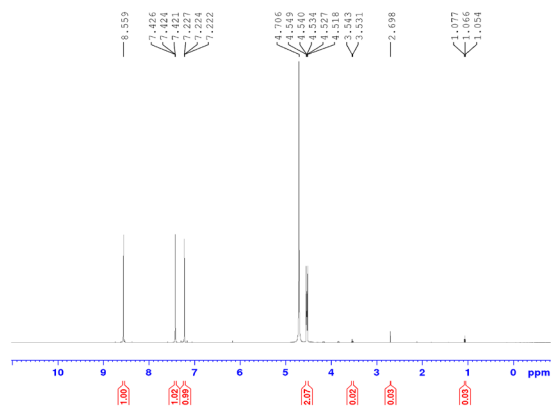
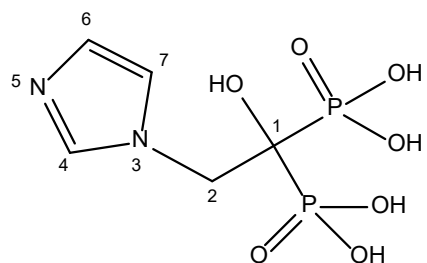


Figure S5. Cumulative, step-wise release of ZOL from the “free” ZOL system.





^1H NMR (D_2O): δ 7.70 (s, 1H, H-4), 7.21 (s, 1H, H-7), 6.84 (s, 1H, H-6), 4.44 (t, 2H, H-2, $^3J_{\text{HP}} = 9.7$). ^{13}C NMR (D_2O , CD_3OD as ref.) δ 141.1 (C-4), 126.8 (C-7), 123.9 (C-6), 76.2 (t, $^1J_{\text{CP}} = 131.5$, P-C-P, C-1), 53.2 (t, C-2, $^2J_{\text{CP}} = 3.4$). ^{31}P NMR (D_2O) δ 16.4. NMR data were consistent to those reported in the literature [29].

Figure S6. ^1H (upper), ^{13}C (middle) and ^{31}P (lower) NMR spectra of zoledronic acid monohydrate. Peak assignments are shown as well based on the numbered structural scheme.

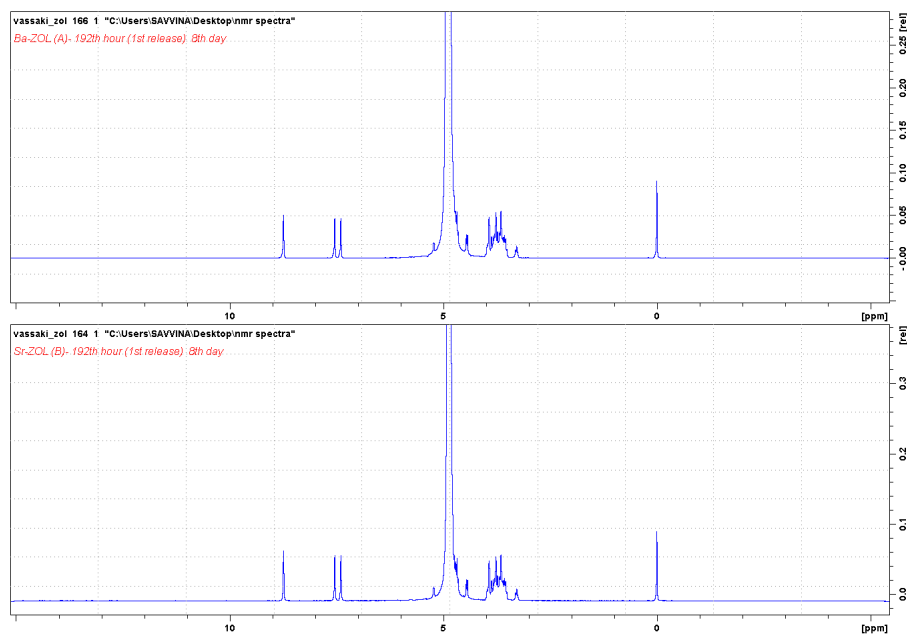


Figure S7. ^1H NMR spectra of released zoledronic acid from the Ba-ZOL (above) and Sr-ZOL (below) systems.

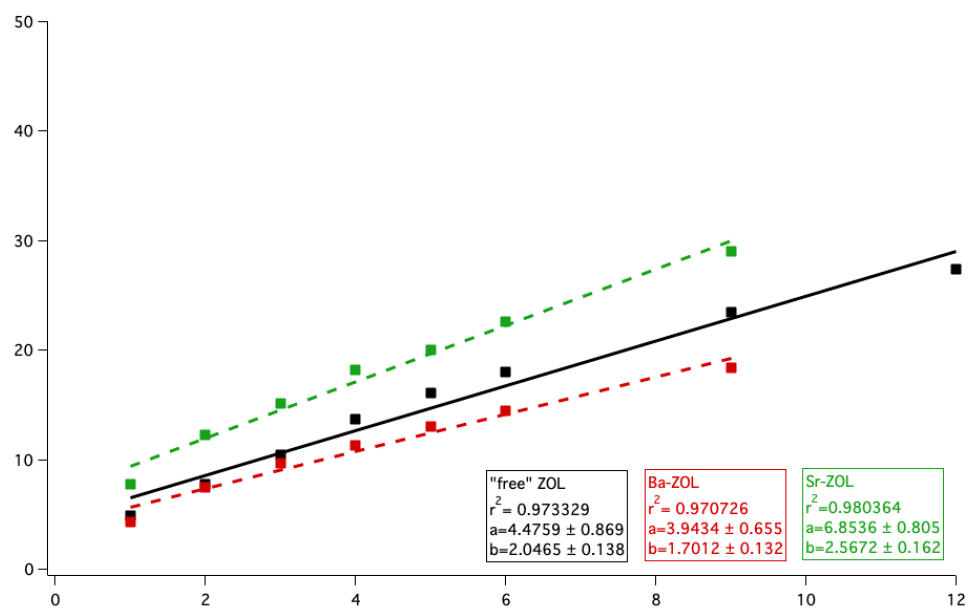


Figure S8. Initial rates of drug release from “free” ZOL, Sr-ZOL and Ba-ZOL.