

Inorganic pyrophosphatase–nanodiamond conjugates hydrolyze pyrophosphate in human synovial fluid

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Supporting Information

Table S1. Parameters of phosphate release from the synthesized calcium pyrophosphate by PPase samples. Conditions: 50 mM Tris-HCl, pH 7.5, 10 mg ml⁻¹ Ca₂P₂O₇·2H₂O, 2 mM MgCl₂, 2 mM CaCl₂, 0.01 µg ml⁻¹ PPase.

| PPase samples | | [P _i] _{max} [µM] | k [hr ⁻¹] |
|---------------|---|--|--------------------------|
| Control | 43 ± 2 | 0.01 ± 0.01 | |
| | Ec-PPase Soluble | 48 ± 2 | 0.02 ± 0.01 |
| | Immobilized on ND-NH ₂ | 26 ± 2 | 0.02 ± 0.01 |
| Mt-PPase | Immobilized on ND-NH-(CH ₂) ₆ -NH ₂ | 40 ± 2 | 0.03 ± 0.01 |
| | Soluble | 28 ± 1 | 0.13 ± 0.02 |
| | Immobilized on ND-NH ₂ | 29 ± 1 | 0.06 ± 0.01 |
| | Immobilized on ND-NH-(CH ₂) ₆ -NH ₂ | 32 ± 1 | 0.04 ± 0.01 |

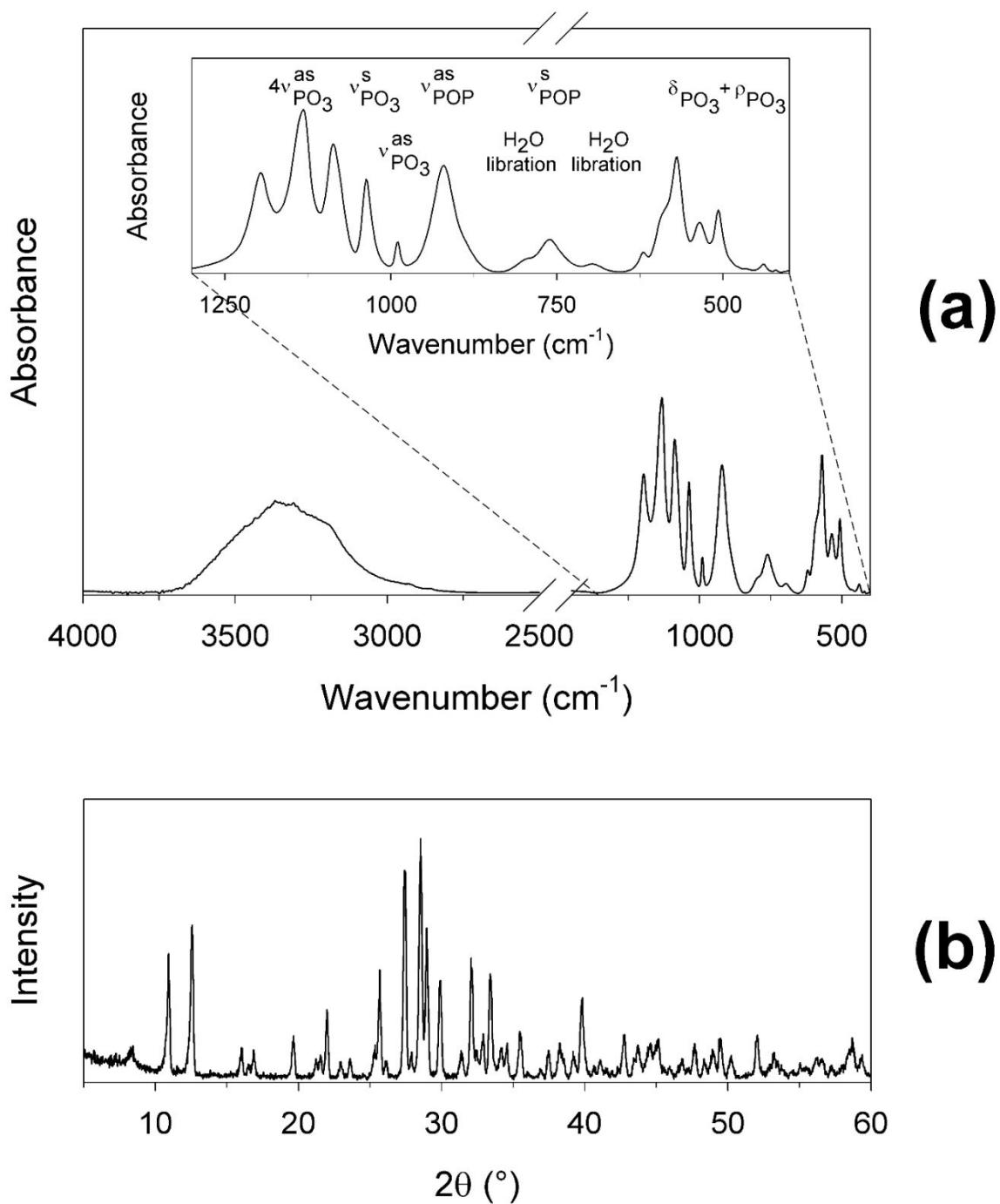


Figure S1. FTIR spectra of synthesized t-CPPD in the $4000\text{--}400\text{ cm}^{-1}$ region (a) and in the $1300\text{--}500\text{ cm}^{-1}$ region (inset). (b) XRD spectra of synthesized t-CPPD.

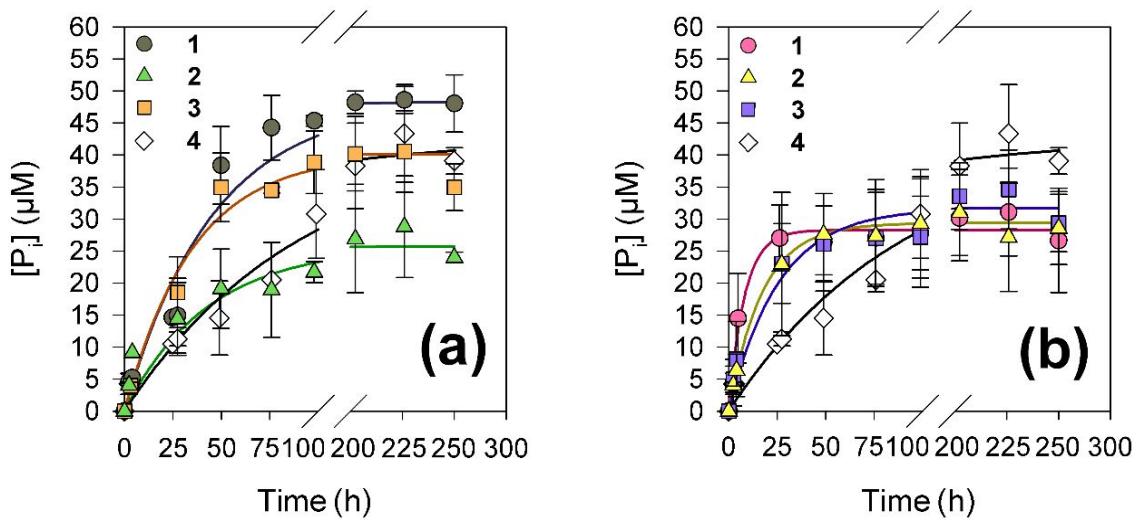


Figure S2. Hydrolysis of the synthesized calcium pyrophosphate by Ec-PPase (a) or Mt-PPase (b) in the soluble form (1) or immobilized on ND-NH₂ (2) or ND-NH-(CH₂)₆-NH₂ (3). Conditions: 50 mM Tris-HCl, pH 7.5, 10 mg ml⁻¹ Ca₂P₂O₇·2H₂O, 2 mM MgCl₂, 2 mM CaCl₂, 0.01 μ g ml⁻¹ PPase. Control experiment (4): the reaction mixture contained all these components except PPase. Lines are the best fit to the first-order kinetics.