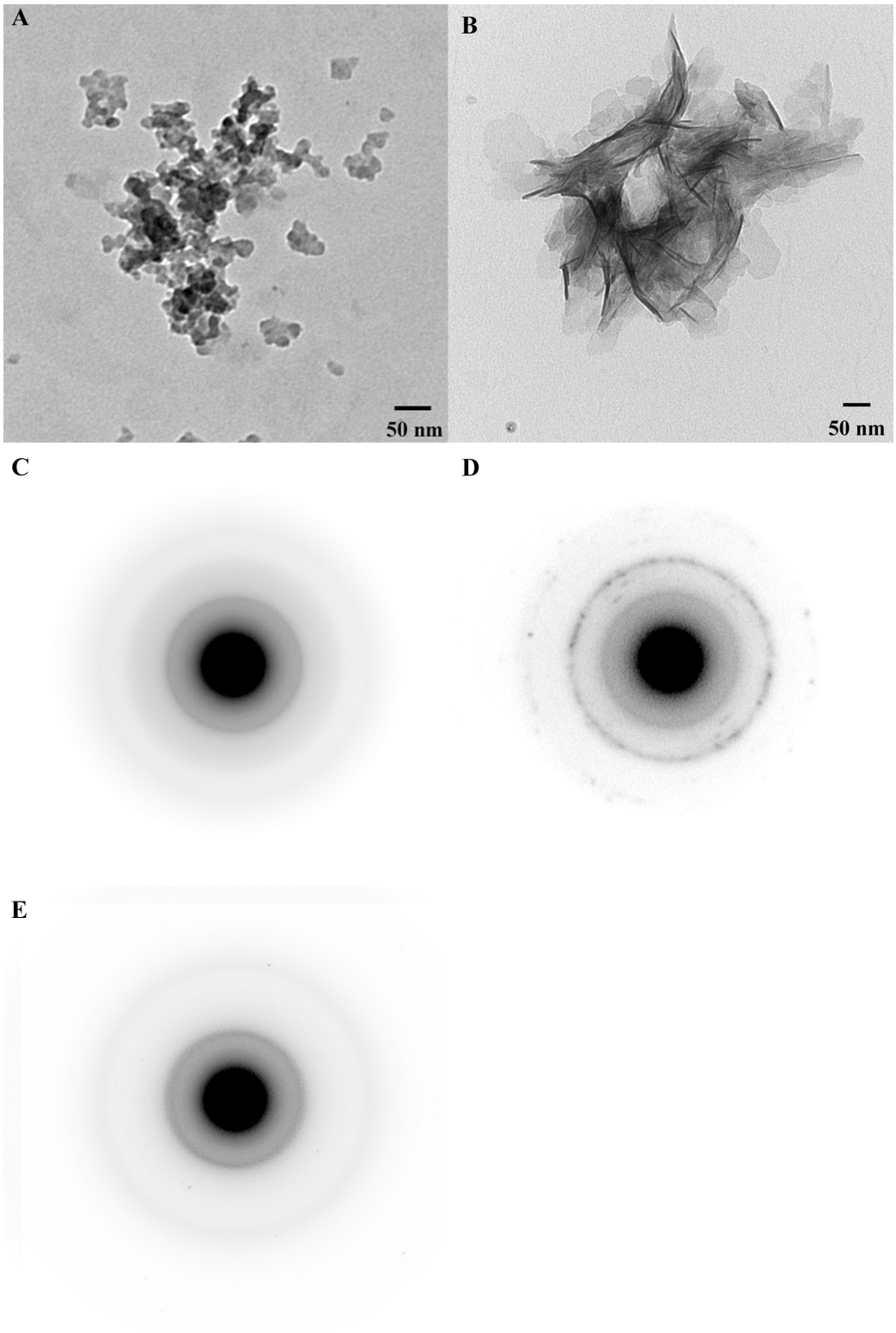
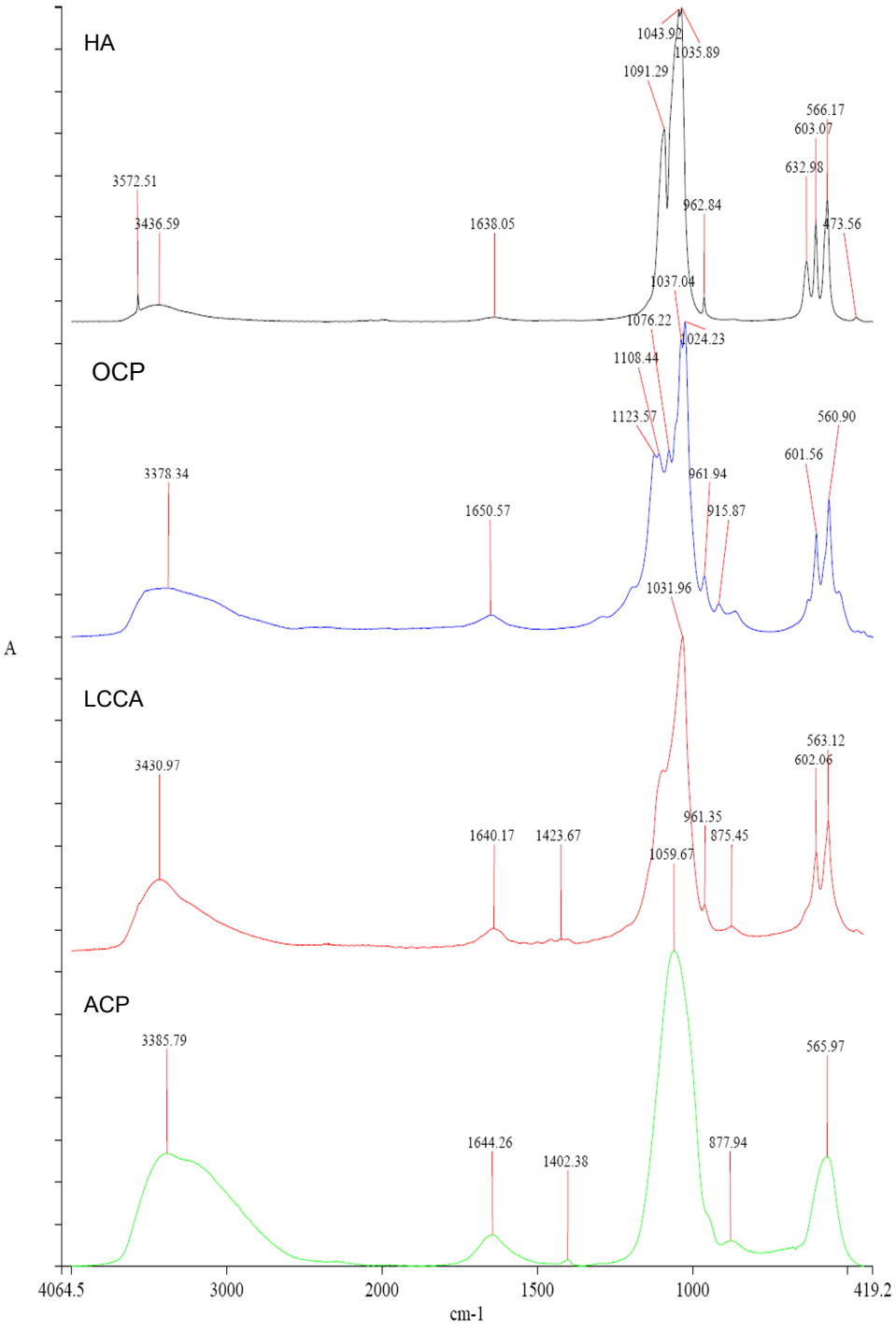
Supplement Figure 1. TEM micrographs of ACP (**A**) and LCCA (**B**), and their corresponding diffraction patterns (**C**) and (**D**), Diffraction pattern (C) is taken from a bare carbon coated grid.



Supplement Figure 2. Absorbance FTIR spectra of HA (black), OCP (blue); LCCA (red) and ACP (green).



The FTIR spectrum of HA is characterized by a sharp peak at 3572.5 cm^{-1}, corresponding the hydroxyl stretching band of structural OH^- groups in the HA crystalline lattice, a doublet of phosphate v_4 peaks at 603 and 566 cm^{-1} and a split v_3 phosphate absorbance band with two maxima around 1040 cm^{-1} and 1090 cm^{-1} (Lehr *et al.*, 1967; Ou-Yang *et al.*, 2000; Rehman and Bonfield, 1997). The highly crystalline stoichiometric HA is also characterized by a band at 633 cm^{-1} arising from OH^- libration (Ou-Yang *et al.*, 2000).
The spectrum of OCP lacks the sharp 3572.5 cm^{-1} band and has 2 well defined phosphate v_4 peaks at 562 and 602 cm^{-1}. Its v_3 band is much broader than HA with the maximum at 1024 cm^{-1} and with a number of smaller phosphate v_3 peaks at 1076, 1008 and 1124 cm^{-1}. It also contains a well distinguished HPO_4^{-2} asymmetric stretching peak at 916 cm^{-1} which is absent in HA spectra. All these features are characteristic of stoichiometric OCP mineral (Dekker *et al.*, 2005; Wang *et al.*, 2008).
The spectrum of low crystallinity carbonated apatite (LCCA) contains a v_3 band with the maximum at 1032 cm^{-1} and a shoulder around 1100 cm^{-1} and doublet v_4 band with maxima at 563 and 602 cm^{-1}. (Gadaleta *et al.*, 1996; Ou-Yang *et al.*, 2000; Termine and Posner, 1966). An absorbance band in the 1400-1500 cm^{-1} region indicates the presence of carbonate ions in the mineral. The carbonate content has been determined to be ~1.1% w/w using carbonate v_3 to phosphate v_3 intensity ratio as described elsewhere (Elangovan *et al.*, 2007; Ou-Yang *et al.*, 2001).
The ACP spectrum contains characteristic broad v_4 and v_3 phosphate bands with the maxima around 565 cm^{-1} and 1056 cm^{-1}, respectively, as reported elsewhere (Gadaleta *et al.*, 1996; Ou-Yang *et al.*, 2000; Termine and Posner, 1966). The strong broad bands with maxima at 1644 and 3380 cm^{-1} indicate the presence of bound water. The absorbance peak in the 1400-1500 cm^{-1} region suggests the presence of small amount of CO_3^{-2} in the mineral, between 0.5 and 1% w/w based on the calculated carbonate/phosphate intensity ratio.

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