**Supplementary material**

**Biosorption of Lead (II) from Aqueous Solution Using Cellulose-based Bio-adsorbents Prepared from Unripe Papaya (Carica papaya) peel waste: Removal Efficiency, Thermodynamics, Kinetics and Isotherm Analysis**

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**Fig. S1.** Influence of pH on lead removal.

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**Fig. S2.** Isotherm models of PP (at 303 K) for: (a) Langmuir (b) Freundlich (c) Temkin and (d) Dubinin- Radushkevich (D-R) models.

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**Fig. S3.** Adsorption kinetic parameters at 303 K: (a) pseudo first order model (b) pseudo second order model and (c) intraparticle diffusion model.

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**Fig. S4.** Van ’t Hoff plot for the adsorption of lead using PP.



**Fig. S5.** Desorption studies for one cycle of PP adsorbent.