ARTICLE

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Self-assembled Pearl-necklace patterned upconverting nanocrystals with highly efficient blue and ultraviolet emission: femtosecond laser based upconversion properties

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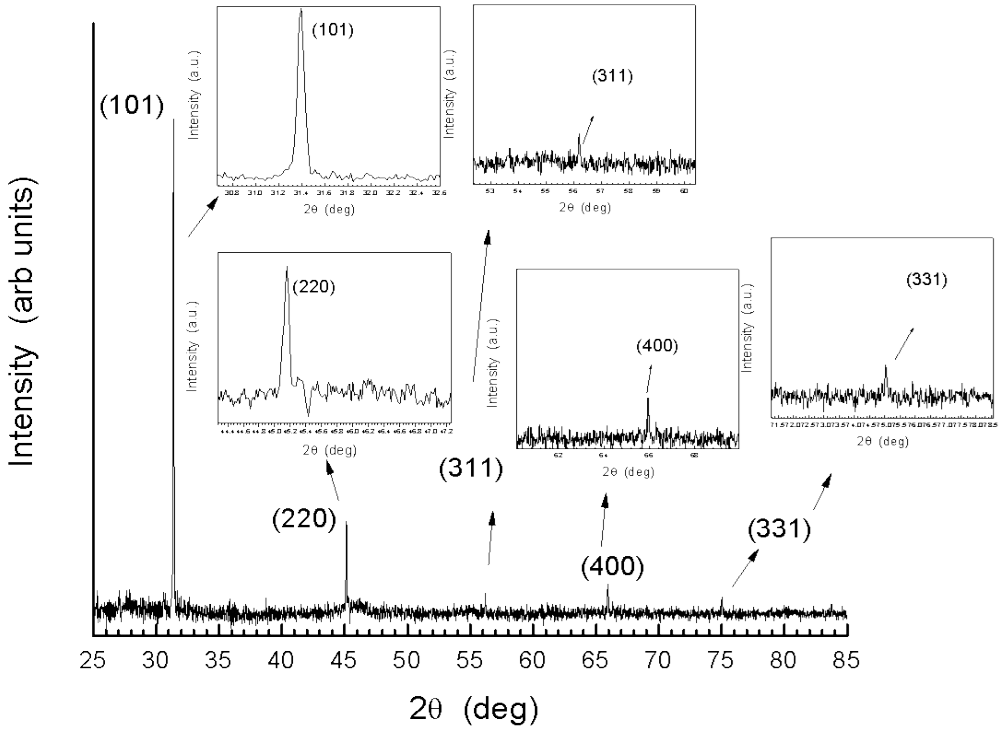
Supplementary information:



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† Footnotes relating to the title and/or authors should appear here.
Electronic Supplementary Information (ESI) available: [details of any supplementary information available should be included here]. See DOI: 10.1039/x0xx00000x

Fig. S1 XRD study of synthesized UCN-PNs confirms the crystalline structure. Insets show the observed peaks with their corresponding crystalline planes according to JCPDS-028-1192

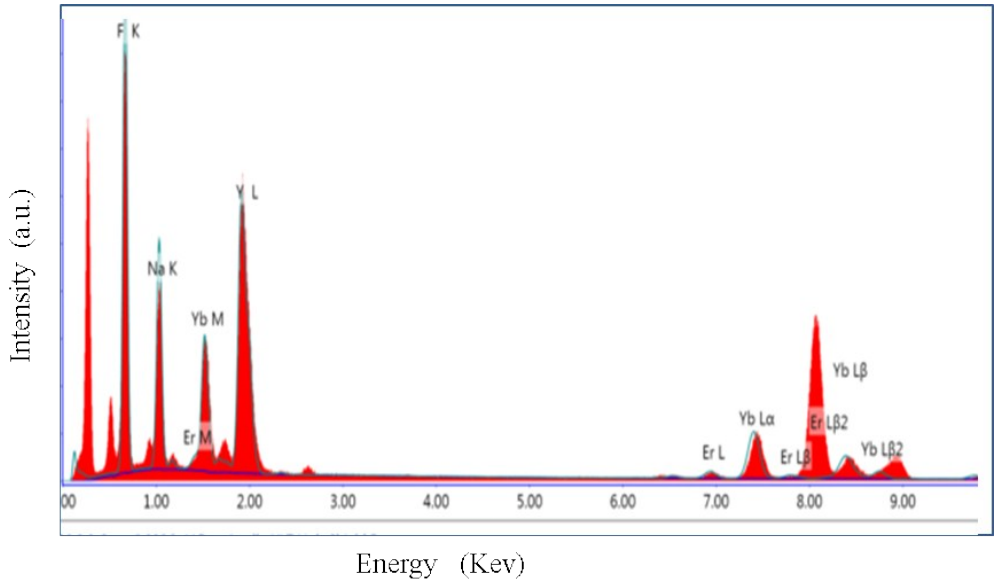

Fig. S2 EDXA spectrum of UCN-PNs confirming the presence of elements

Table S1 Elemental compositions observed in EDAX spectrum

Element	Weight (%)	Atomic (%)
F	44.79	49.97
Na	54.05	49.83
Er	0.11	0.01
Yb	0.62	0.08
Y	0.42	0.1

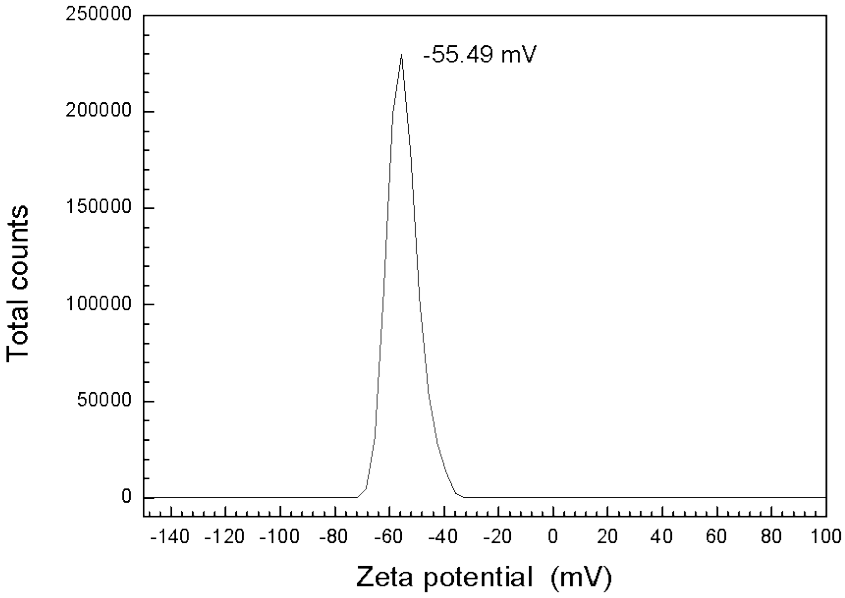

Fig. S3 Zeta potential value found to be -55.49 mV for colloidal aqua solution of UCN-PNs

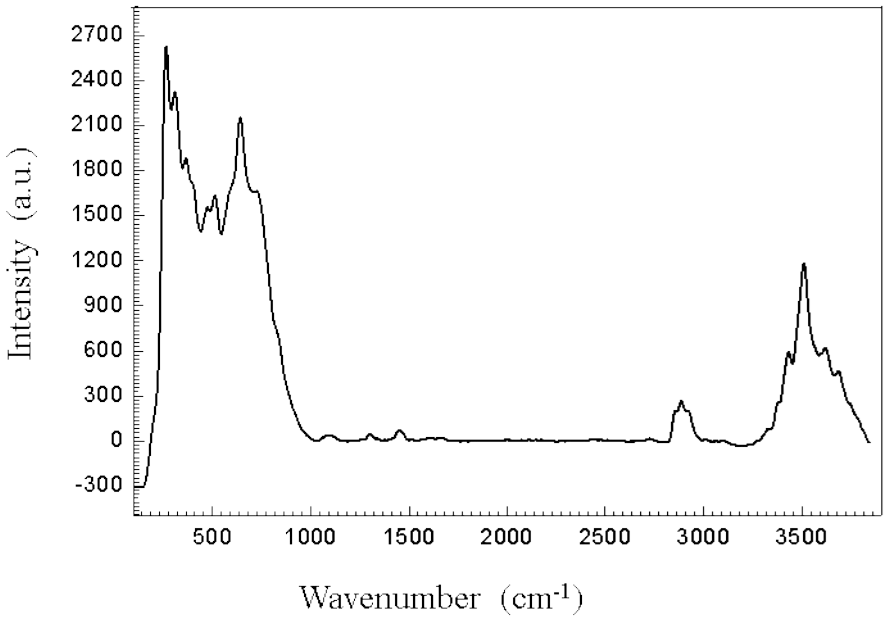

Fig. S4 Raman spectrum of UCN-PNs with entire region

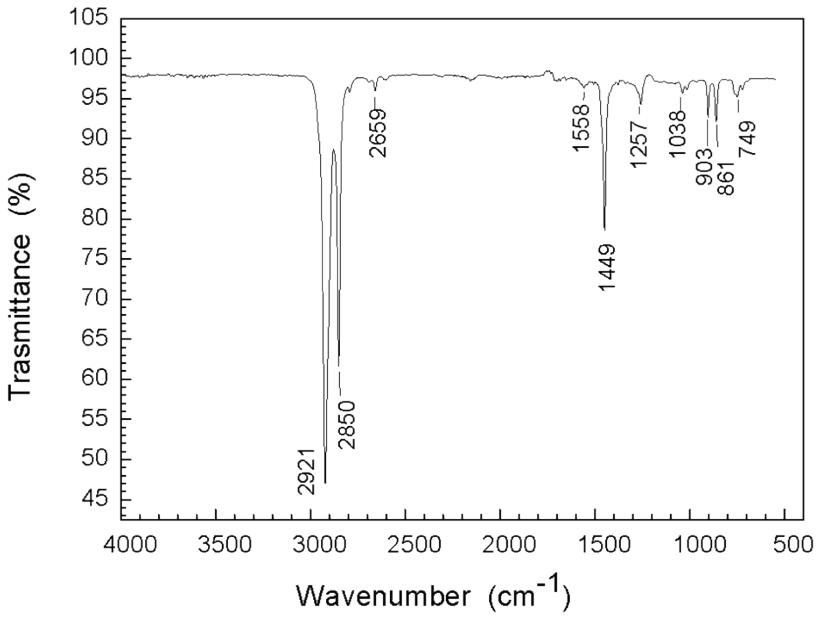

Fig. S5 FTIR spectrum of UCN-PNs confirming the presence of different groups in oleic acid and formation of UCNPs

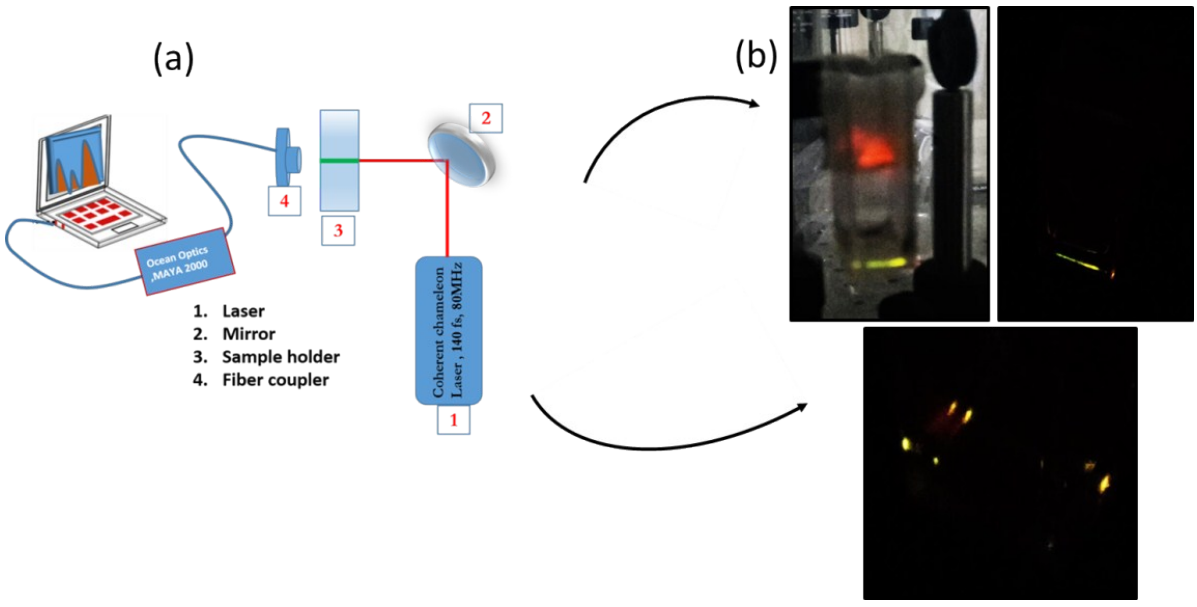

Fig. S6 (a) Schematic of Femtosecond laser (Fs)set-up arrangement (b) Images are captured while visible emissions are observed in cuvette-sample once it is excited with Fs-laser sources.

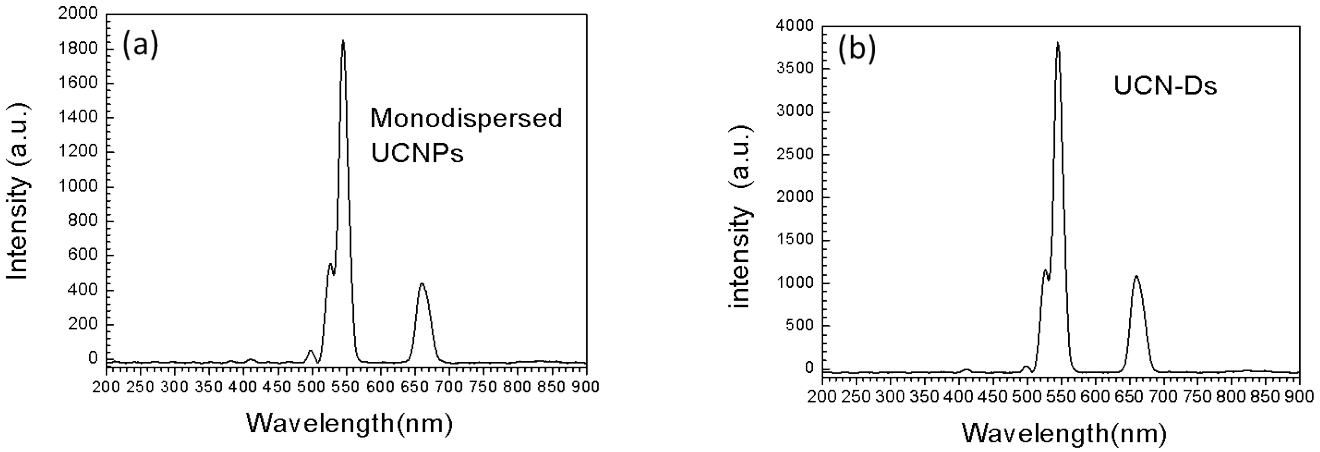

Fig. S7 Upon excitation with 980nm CW wave source the obtained upconversion emission spectra for (a) monodispersed UCNPs (b) synthesized necklace-UCNPs; The highest intensity in Fig (b) is 2 times higher than that observed in Fig. (a)