Upconverting temperature sensors with high activation energy and low pump threshold

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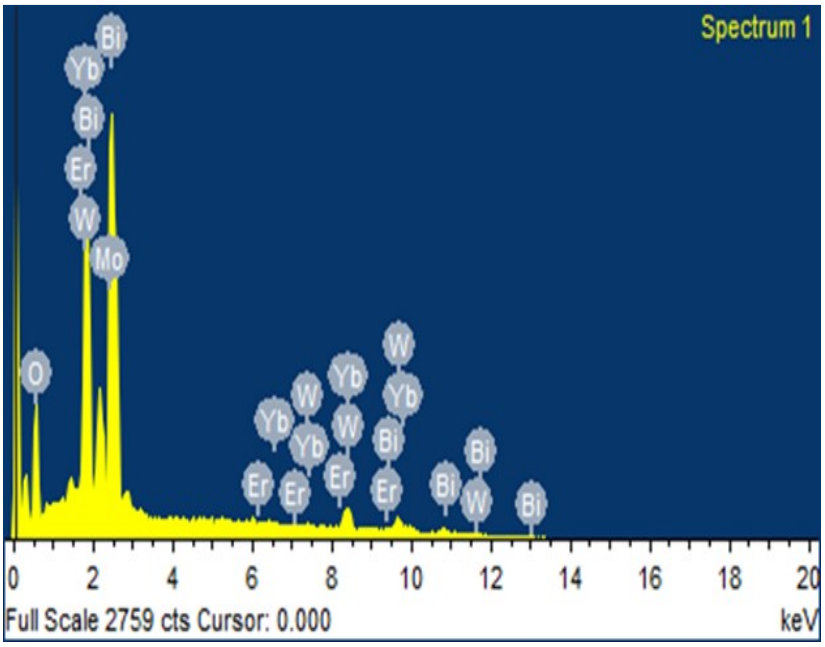

Fig S1. EDX spectra of $Er^{3+}/Yb^{3+}/Mo^{6+}$: Bi_2WO_6 phosphor

The atomic % of dopants in Bi_2WO_6 phosphor have been obtained by EDX instrument given in the table S1. The concentration of Mo is too small and therefore have not been calculated by the instrument.

Table S1: Elements and atomic% present in the codoped Bi_2WO_6 phosphor

Element	Atomic%
O K	75.44
Er M	0.15
Yb M	0.15
W M	12.67
Bi M	20.95

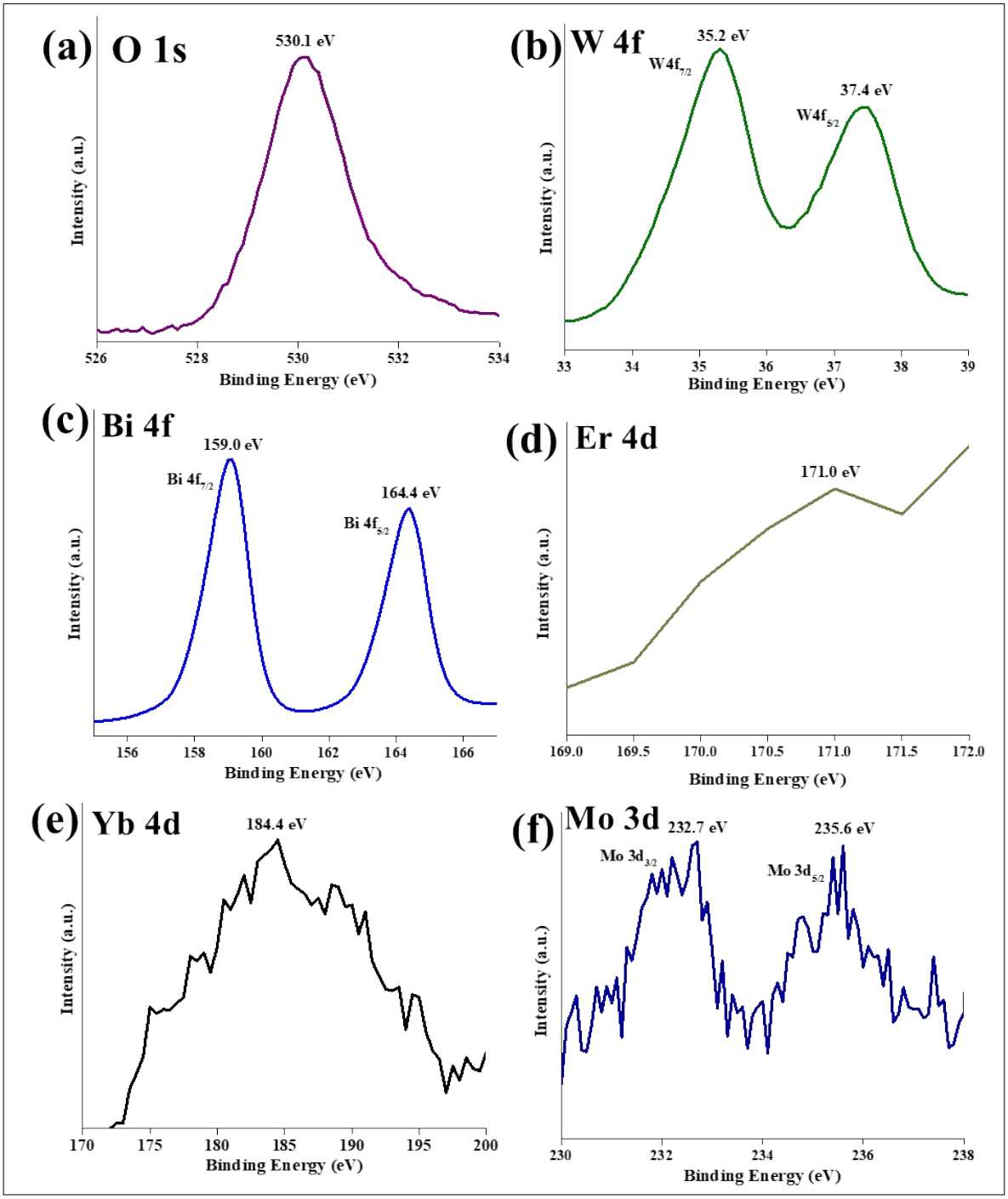

Fig. S2. High resolution XPS scan of (a) O 1s (b) W 4f (c) Bi 4f (d) Er 4d (e) Yb 4d and (f) Mo 3d.

The atomic % of dopants in Bi_2WO_6 phosphor have been obtained by XPS instrument (survey scan) given in the table S2.

Table S2: Elements and atomic% present in the codoped Bi_2WO_6 phosphor

Element	Atomic%
O 1s	58.6
Bi 4f	18.7
W 4f	15.5
Yb 4d	6.0

Er 4d	1.1
Mo 3d	< 0.1

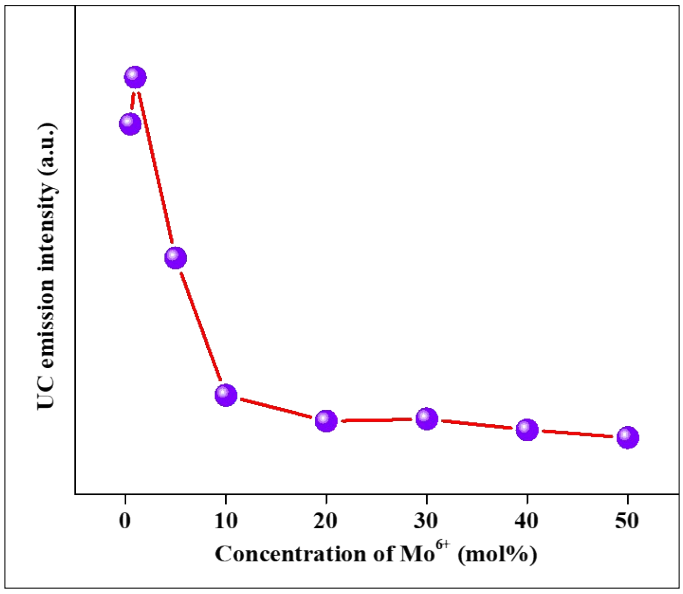

Fig.S3. UC emission integrated area for different concentration of Mo^{6+} ions.

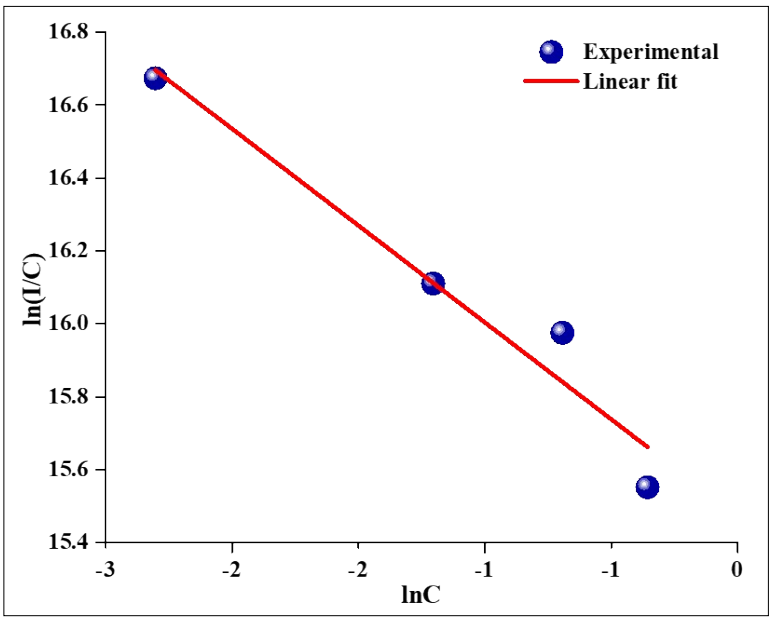

Fig.S4. The relationship of ln(I/C) with ln(C) for the Er^{3+} doped Bi_2WO_6 phosphors.

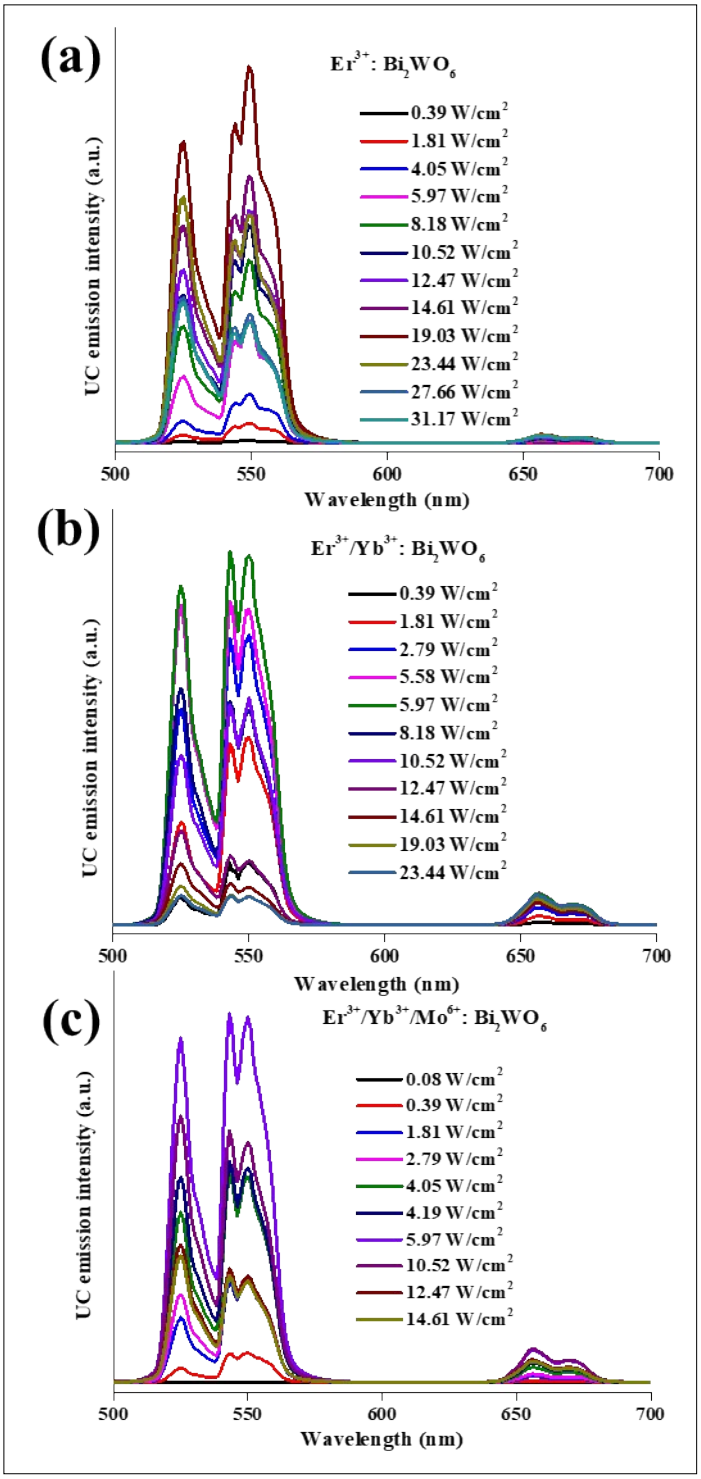

Fig.S5. The pump power density dependent UC emission intensity upon 980 nm excitation of the Er^{3+}, Er^{3+}/Yb^{3+} and $Er^{3+}/Yb^{3+}/Mo^{6+}$: Bi_2WO_6 phosphor.