Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Imformation

Study into interface engineering and chemical bond of the ReS_2@ZnO Heterointerface for efficient charge transfer and nonlinear optical conversion efficiency

Xin-Yu Zheng[1], Hong-Yu Li[1], Bing-Yin Shi[1], Hong-Xu Cao[1], Yu Liu[1], and Hai-Tao Yin[1,*]

[1]*Key Laboratory of Photonic and electric Bandgap materials, Ministry of Education, School of Physics and Electronic Engineering, Harbin Normal University, Harbin, 150025, Heilongjiang Province, China*

**Corresponding author：wlyht@126.com*

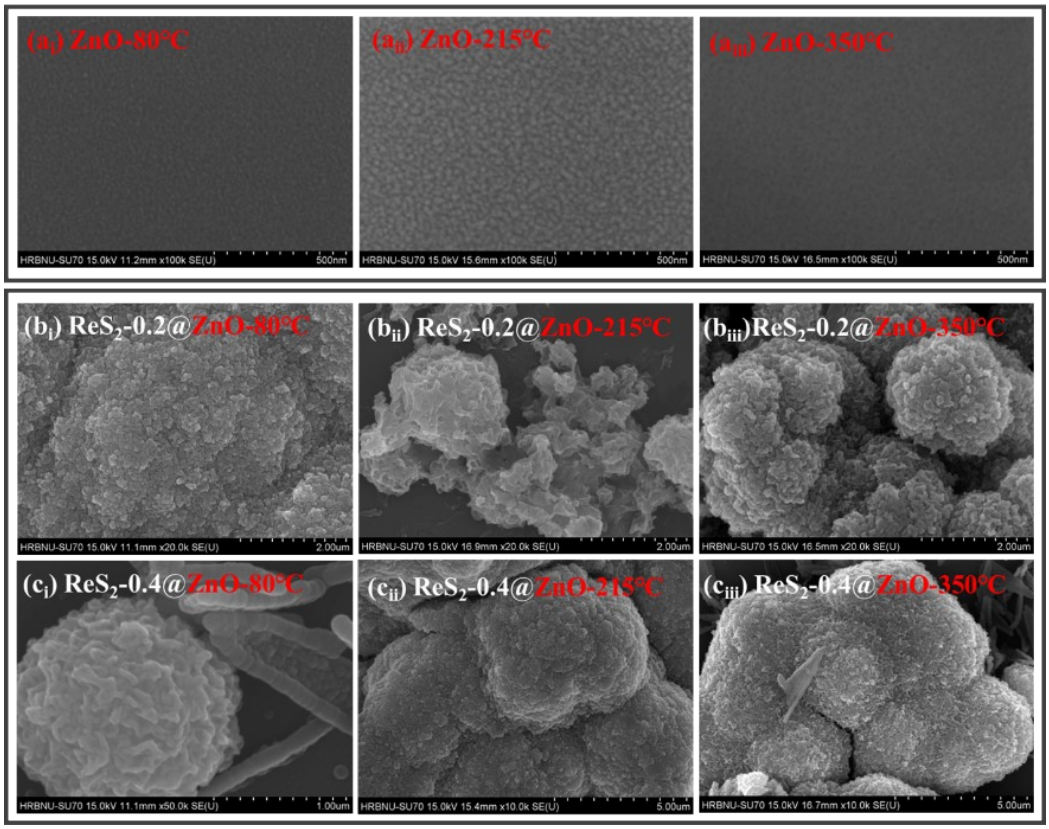

Fig. S1. SEM images of ZnO and ReS_2@ZnO at different condition: a_i) ZnO-80℃, a_{ii}) ZnO-215℃, a_{iii}) ZnO-215℃, b_i) ReS_2-0.2mmol@ZnO-80℃, b_{ii}) ReS_2-0.2mmol@ZnO-215℃, b_i) ReS_2-0.2mmol@ZnO-350℃, c_i) ReS_2-0.4mmol@ZnO-80℃, c_{ii}) ReS_2-0.4mmol@ZnO-215℃, c_i) ReS_2-0.4mmol@ZnO-350℃.

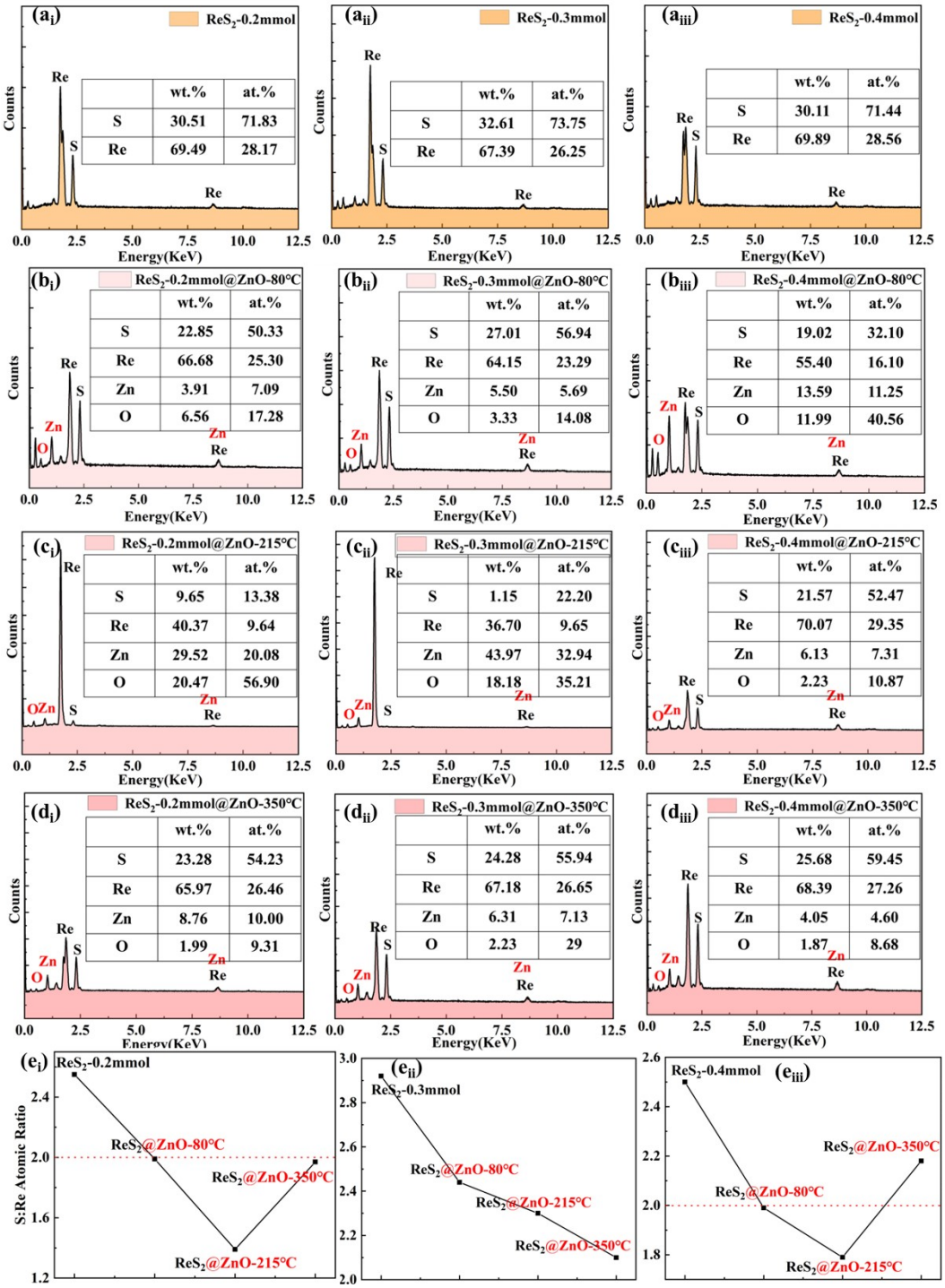

Fig. S2. EDS images of (a_i) ReS_2-0.2mmol, (a_{ii}) ReS_2-0.3mmol, (a_{iii}) ReS_2-0.4mmol, (b_i) ReS_2-0.2mmol@ZnO-80°C, (b_{ii}) ReS_2-0.3mmol@ZnO-80°C, (b_{iii}) ReS_2-0.4mmol@ZnO-80°C, (c_i) ReS_2-0.2mmol@ZnO-215°C, (b_{ii}) ReS_2-0.3mmol@ZnO-215°C, (b_{iii}) ReS_2-0.4mmol@ZnO-215°C, (d_i) ReS_2-0.2mmol@ZnO-350°C, (d_{ii}) ReS_2-0.3mmol@ZnO-350°C, (d_{iii}) ReS_2-0.4mmol@ZnO-350°C, (e_i) ReS_2-0.2mmol@ZnO-temperature, (e_{ii}) ReS_2-0.3mmol@ZnO-temperature, (b_{iii}) ReS_2-0.4mmol@ZnO-temperature.

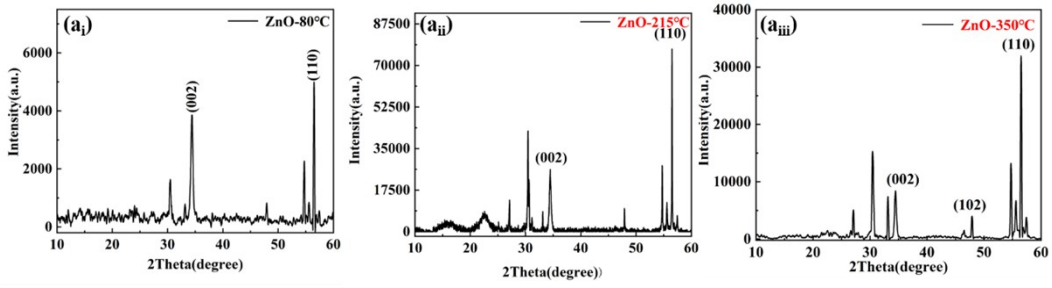

Fig. S3. XRD images of (a_i) ZnO-80°C, (a_{ii}) ZnO-215°C, (a_{iii}) ZnO-350°C.

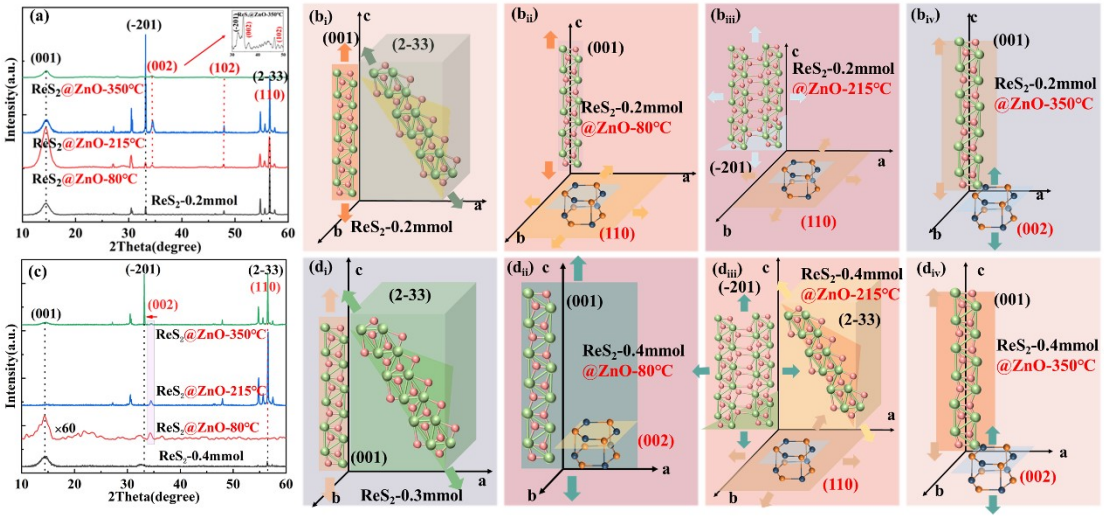

Fig. S4. XRD images of (a) ReS_2-0.2mmol, ReS_2-0.2mmol @ ZnO-temperature. (c) ReS_2-0.4mmol, ReS_2-0.4mmol @ ZnO-temperature. Growth orientation of (b_i) ReS_2-0.2mmol, (b_{ii}) ReS_2-0.2mmol@ZnO-80 °C, (b_{iii}) ReS_2-0.2mmol@ZnO-215°C, (b_{iv})ReS_2-0.3mmol@ZnO-350°C, (d_i) ReS_2-0.2mmol, (d_{ii}) ReS_2-0.2mmol@ZnO-80 °C, (d_{iii}) ReS_2-0.2mmol@ZnO-215°C, (d_{iv})ReS_2-0.3mmol@ZnO-350°C.

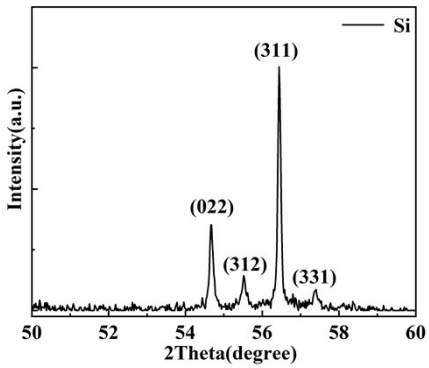

Fig. S5. XRD images of Si substrate.

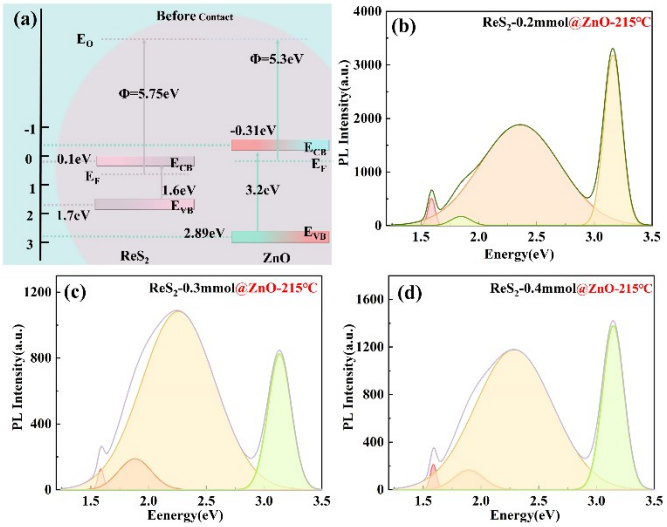

Fig. S6. Energy levels diagram of ReS_2 and ZnO (a). The Gaussian fitted PL emission spectra of ReS_2-0.2mmol @ ZnO-215 °C (b), ReS_2-0.3mmol @ ZnO-215 °C (c) and ReS_2-0.4mmol @ ZnO-215 °C (d).

Table S1. Time of attenuation of transient absorption dynamics

Samples	τ_1 (ps)	τ_2 (ps)	τ_3 (ps)	τ_4 (ps)
ReS_2	1.89	2.6	2.2×10^3	-
ReS_2@ZnO	0.88	2.67	1×10^4	7.3×10^6