Enhanced performance of Mg_2Si/Si heterojunction photodetector grown with the assistance of nanostructures

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Supporting Information

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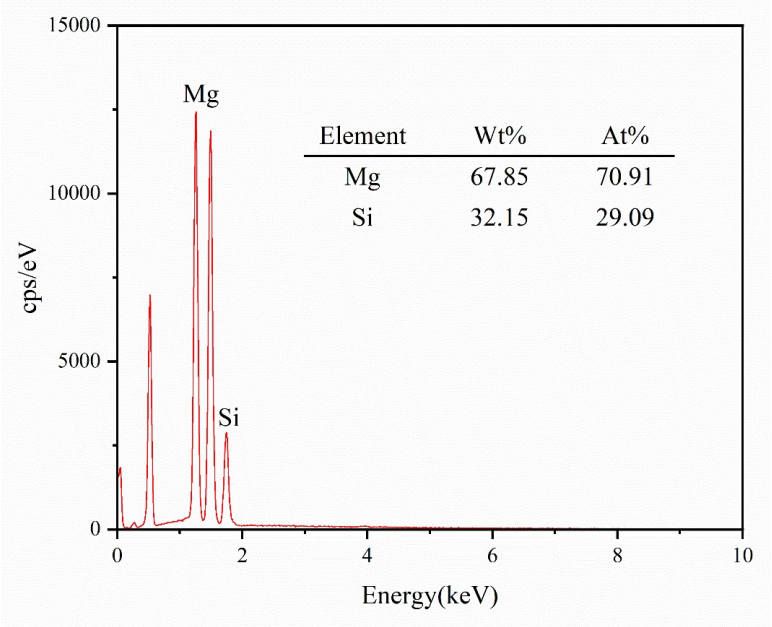

Figure S1. EDS elemental analysis of Mg_2Si film.

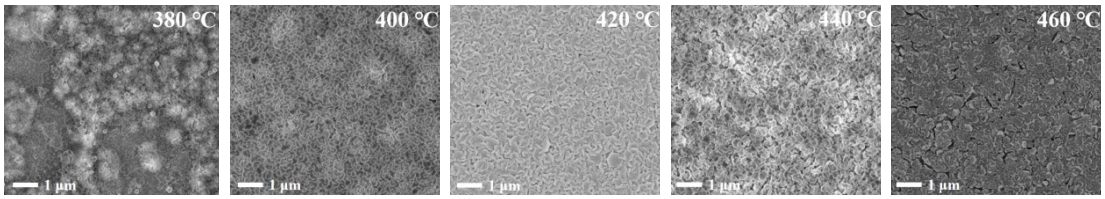

Figure S2. SEM images of Si-based Mg_2Si thin films with different annealing temperatures.

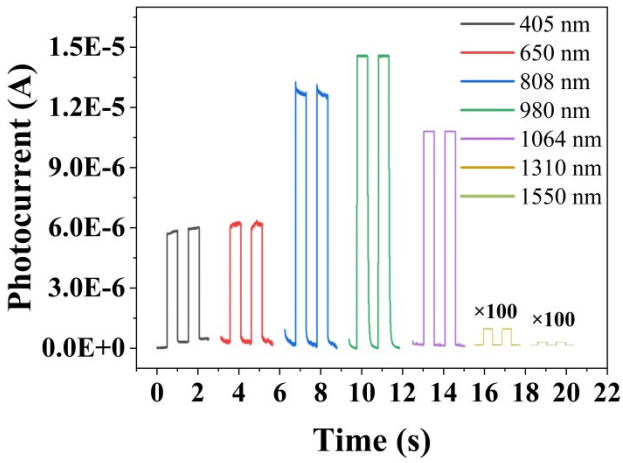

Figure S3. Optical response of Mg_2Si/Si heterojunction photodetector at different wavelengths with an annealing temperature of 420 °C and an annealing time of 8 h.

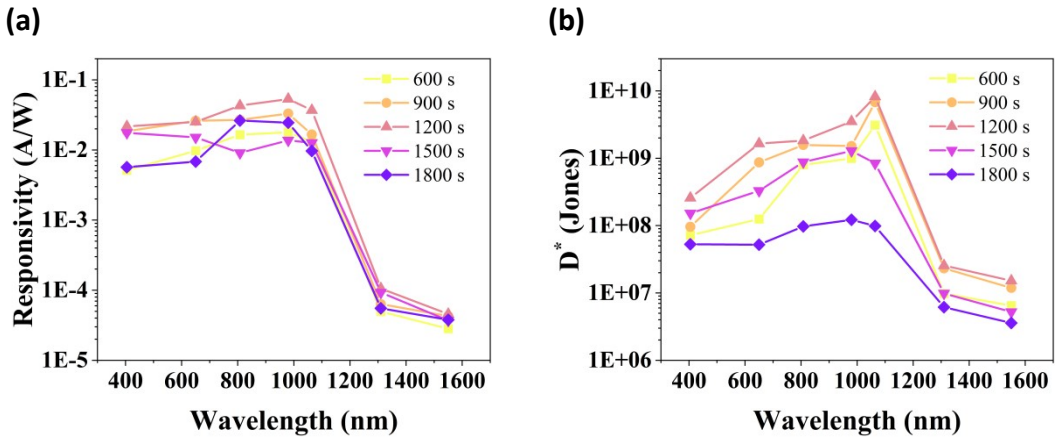

Figure S4. Performance of Mg_2Si/Si heterojunction devices with different sputtering time of Mg films at -1 V bias. (a) Responsivity comparison; (b) Specific detectivity (D^*) comparison.

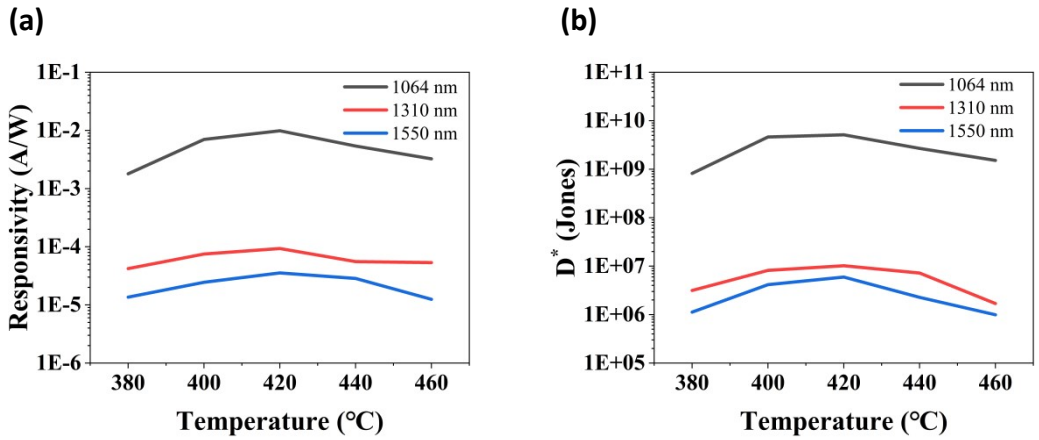

Figure S5. Performance of photoconductors based on Mg_2Si films with different annealing temperatures at 1064 nm, 1310 nm and 1550 nm wavelengths. (a) Responsivity; (b) Specific detectivity (D^*).

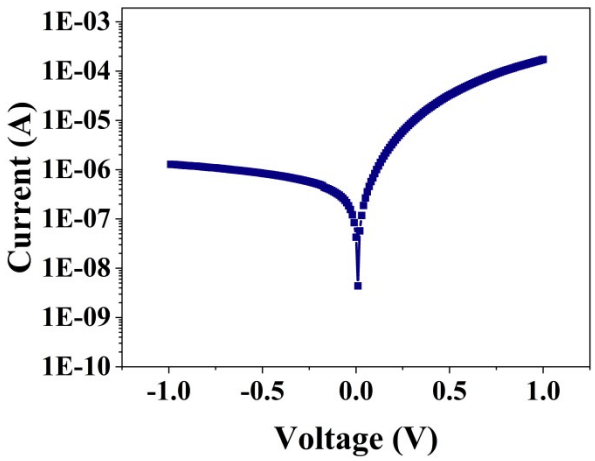

Figure S6 I-V curve in dark of Mg_2Si/Si heterojunction photodetector grown with the assistance of nanostructures.

Table S1 Hall test results of Mg_2Si film.

Sample	Temperature (K)	Type	Mobility $cm^2/(V*s)$	Carrier concentration $1/cm^3$
Mg_2Si	300	P	4.15	5.2E15

Table S2 Performance comparison of our Mg_2Si/Si heterojunction photodetector with other Mg_2Si-based infrared photodetectors.

Materials	R (mA/W)	Switching Ratio	τ_r/τ_f	D^* (Jones)	Wavelength (nm)	Ref
Mg_2Si/Si	1040	6250	2.74/1.34ms	8.98×10^{11}	532-1550	[1]
Mg_2Si/Si	470	/	113/116μs	/	800-1350	[2]
p-Mg_2Si/ n-Mg_2Si	1.4	/	/	/	950-1800	[3]
MLG/Mg_2Si/Si	23.7	4086	/	1.2×10^{10}	980-1180	[4]
Mg_2Si/Si	14.76	2341	/	7.4×10^{9}	1000-1150	
Mg_2Si/Si	60	15740	1.72/1.61ms	8.51×10^{9}	405-1550	This work
Mg_2Si/Si-nano	183	9780	1.68/0.87ms	9.43×10^{9}	405-1550	

References:

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