Supplementary Information

Thermoreversible adhesive with precisely temperature-controlled detachment enabled by temperature-responsive crystalline domains

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Supporting Fig. s

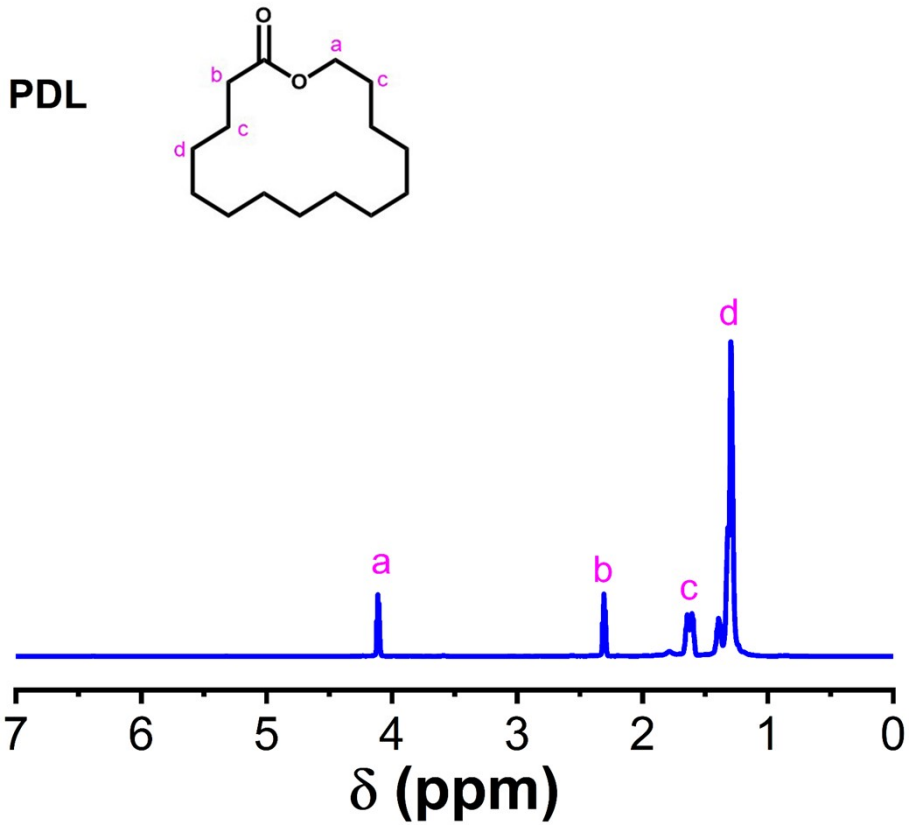

Fig. S1 ^{1}H NMR spectra of PDL in deuterated $CDCl_3$.

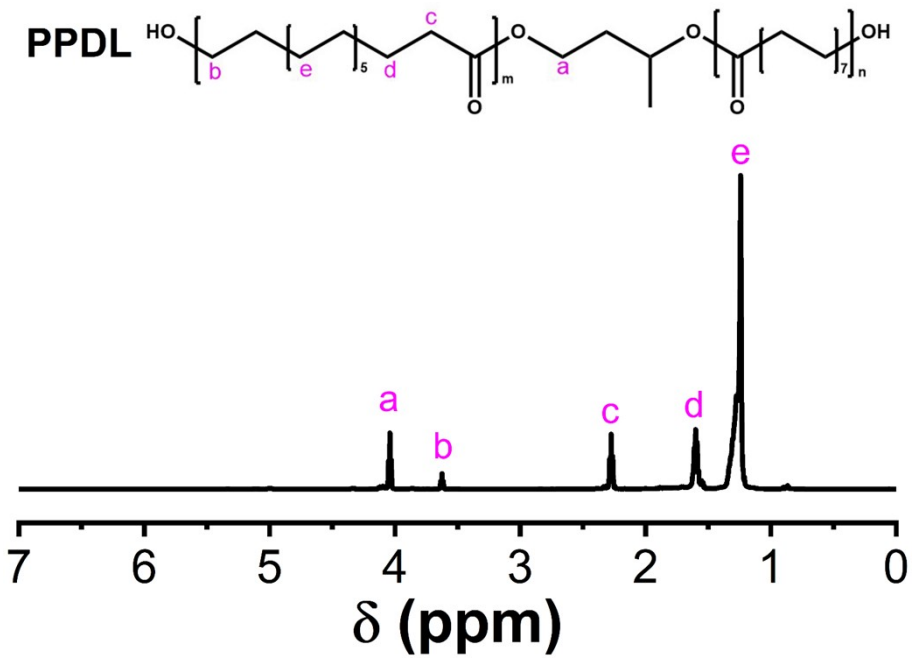

Fig. S2 ^{1}H NMR spectra of PPDL in deuterated $CDCl_3$.

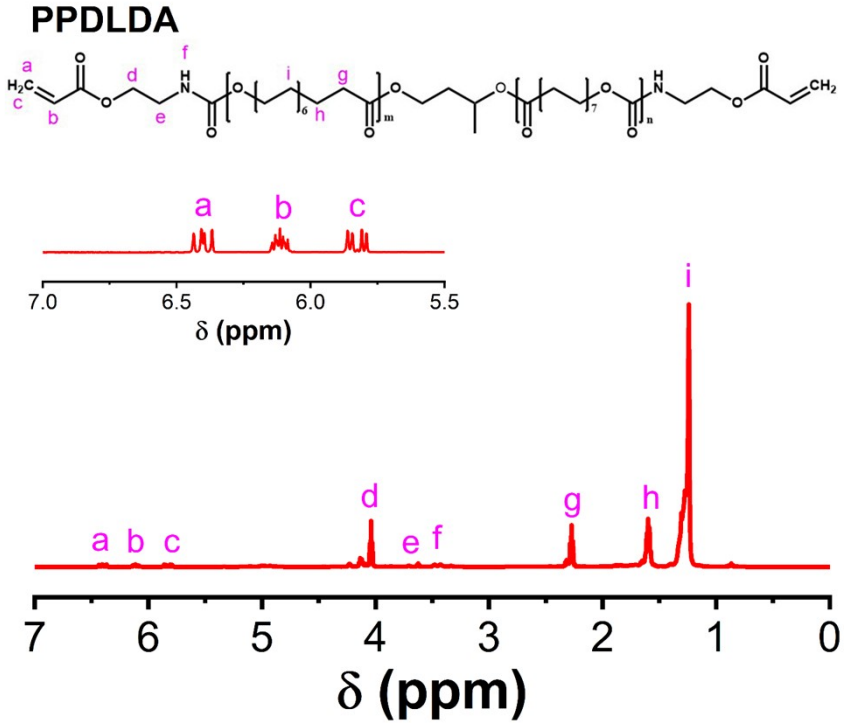

Fig. S3 ^{1}H NMR spectra of PPDLDA in deuterated $CDCl_3$.

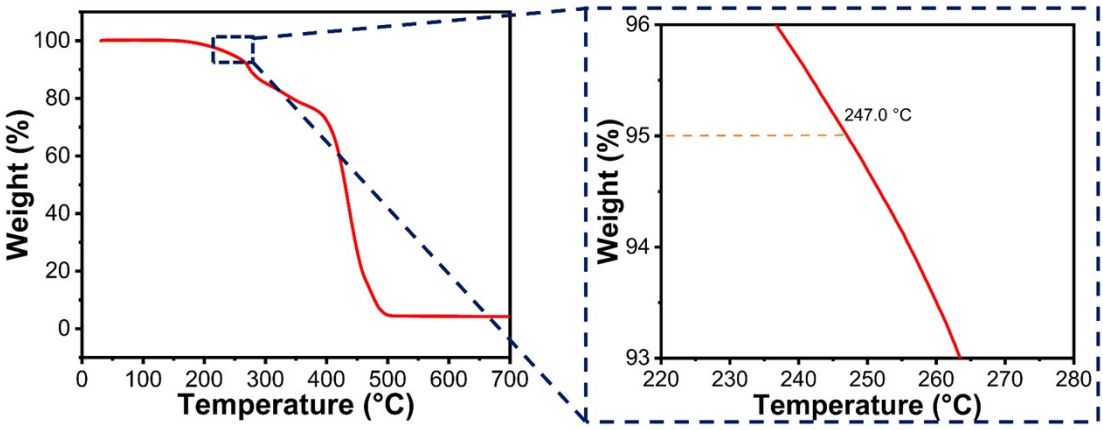

Fig. S4 TG analysis. TG curve of PPDLDA and its local enlarged image.

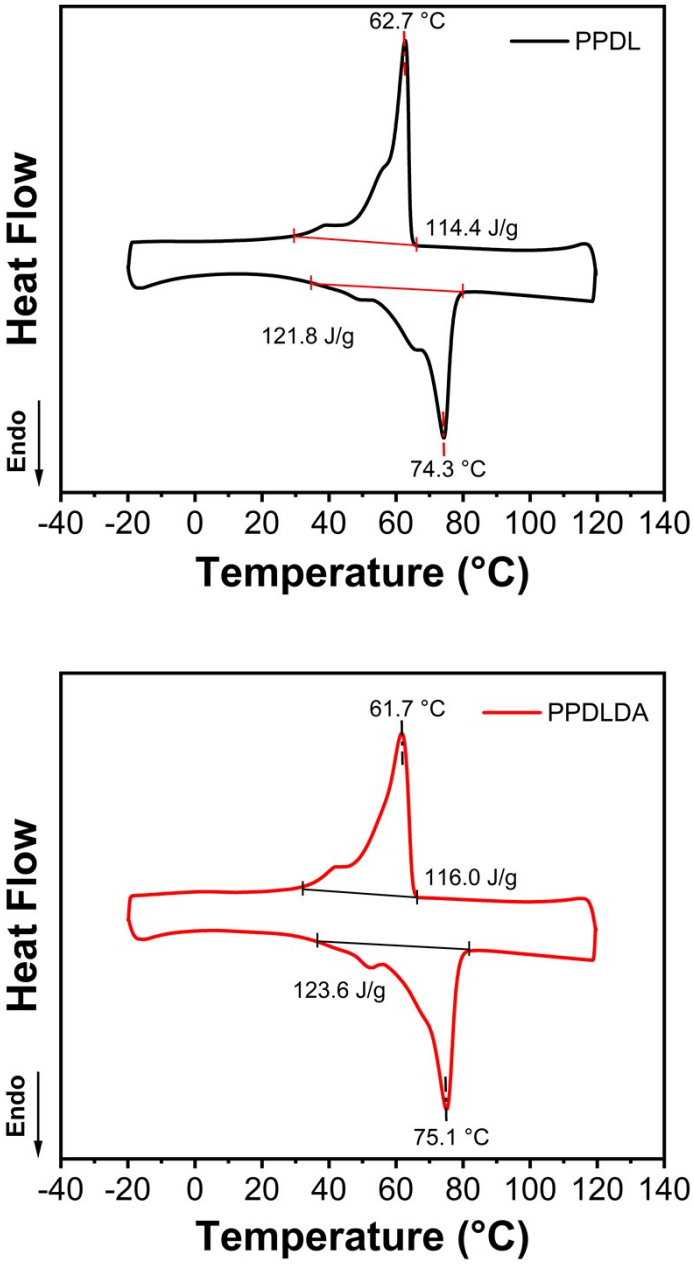

Fig. S5 DSC curves of PPDL and PPDLDA.

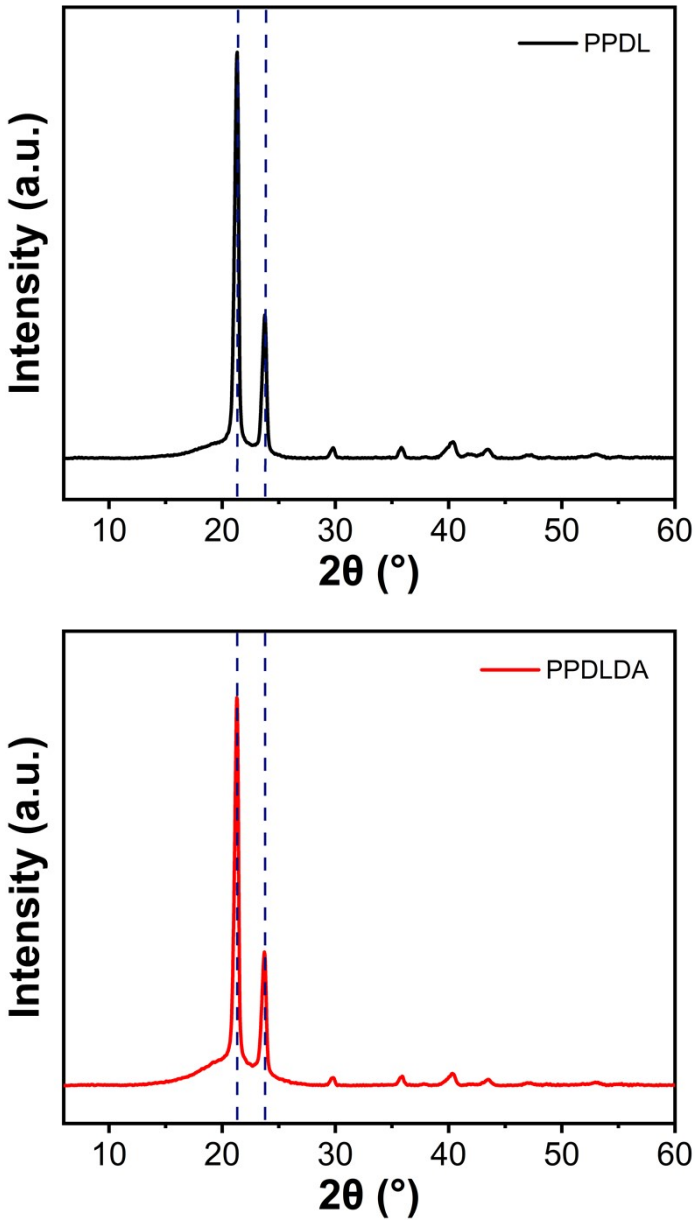

Fig. S6 XRD patterns of PPDL and PPDLDA.

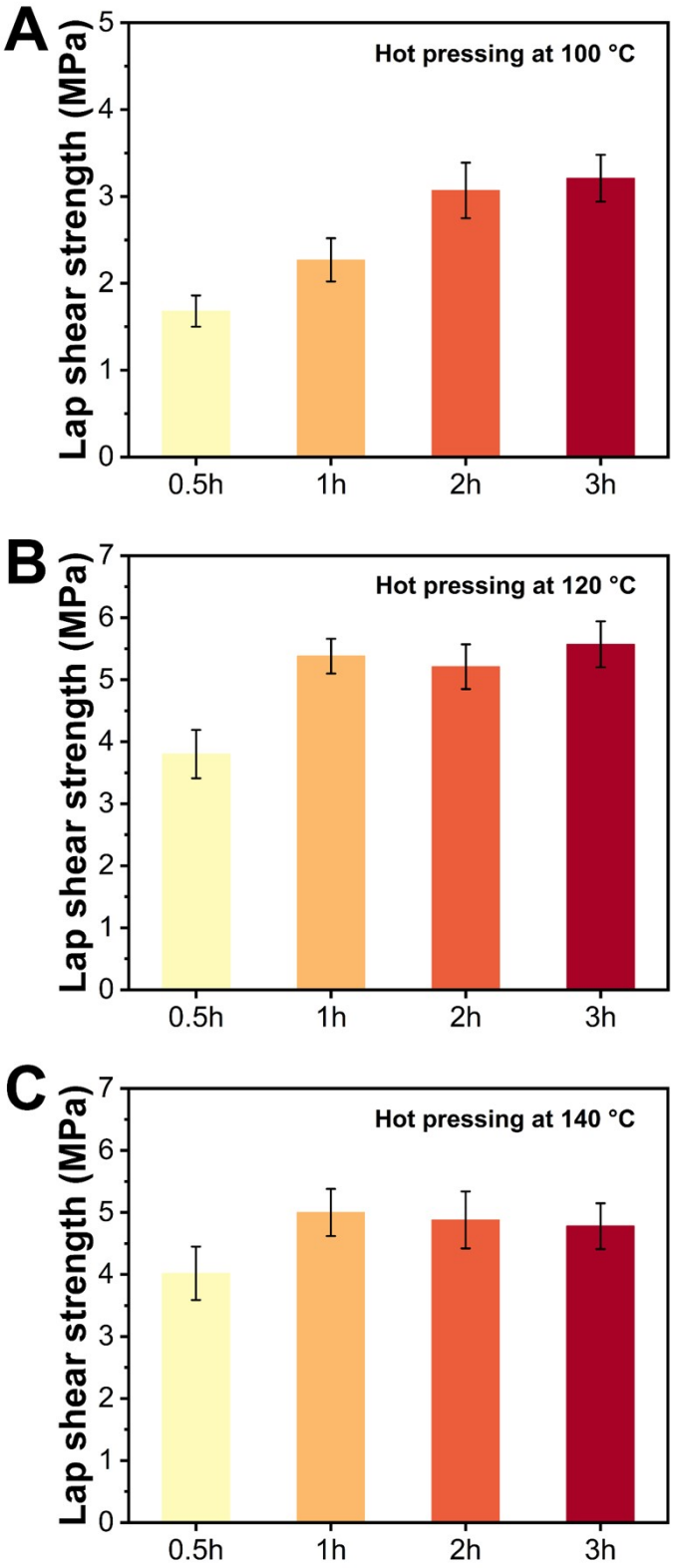

Fig. S7 (A) Lap shear strength of the AB-P_{30} adhesive after being heated and pressed at 100 °C for different durations; (B) Lap shear strength of the AB-P_{30} adhesive after being heated and pressed at 120 °C for different durations; (C) Lap shear strength of the AB-P_{30} adhesive after being heated and pressed at 140 °C for different durations.

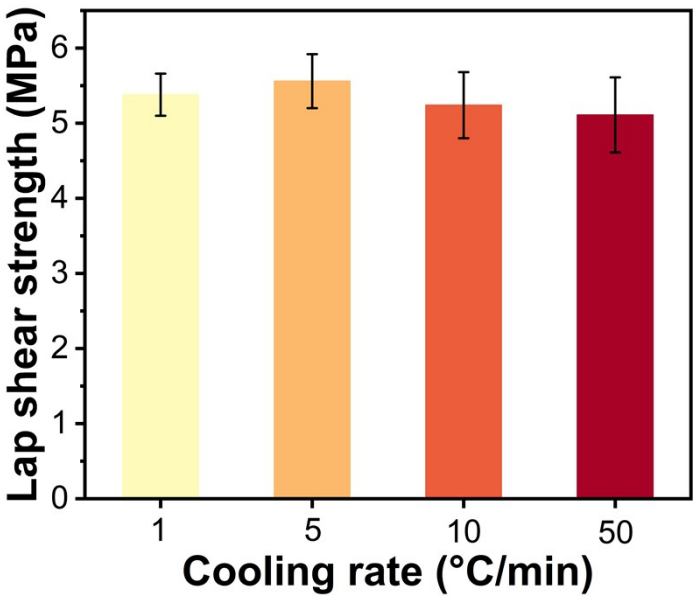

Fig. S8 Lap shear strength of the AB-P_{30} adhesive at different cooling rates after hot pressing.

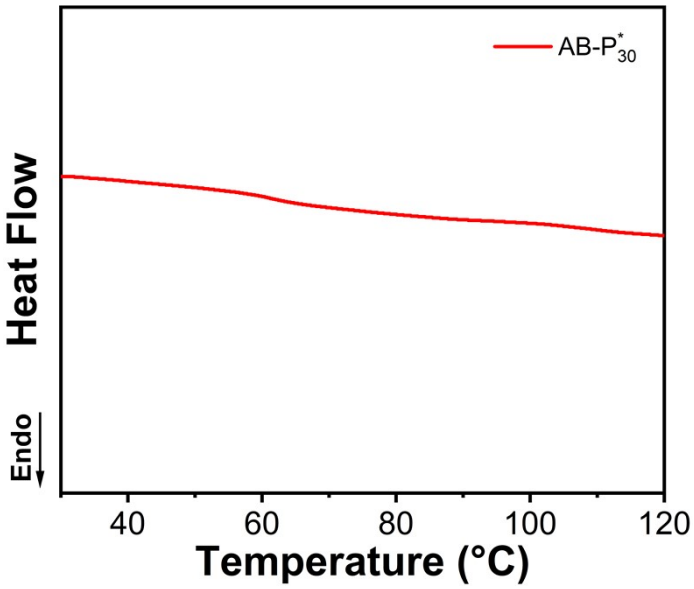

Fig. S9 DSC curve of the AB-P^{*}_{30} adhesive.

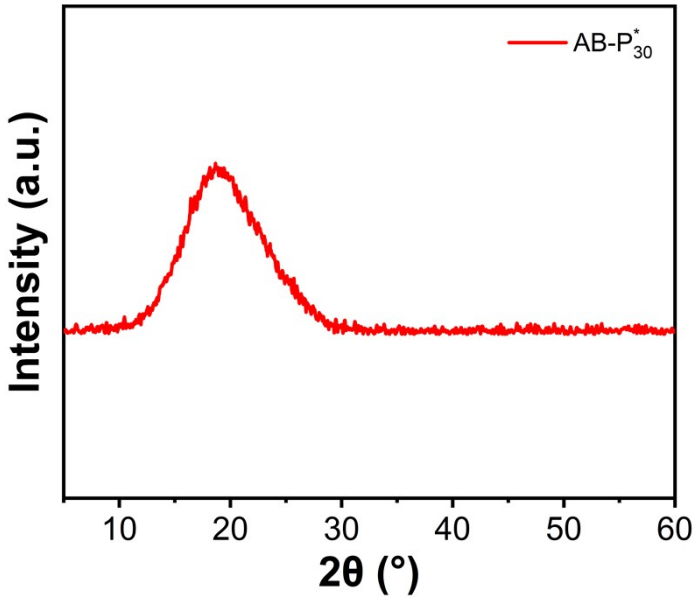

Fig. S10 XRD pattern of the AB-P^*_{30} adhesive.

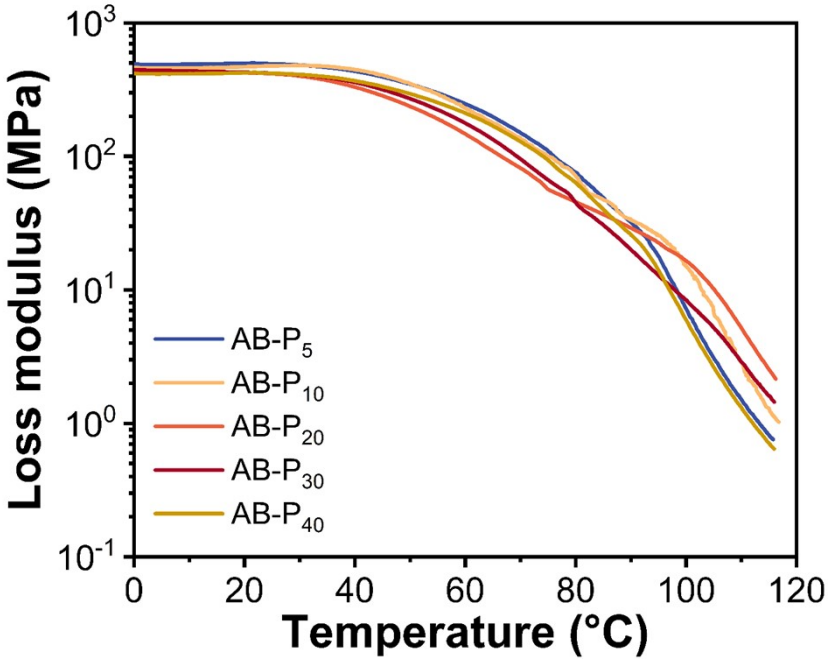

Fig. S11 Storage modulus as a function of temperature for the AB-P_x adhesives.

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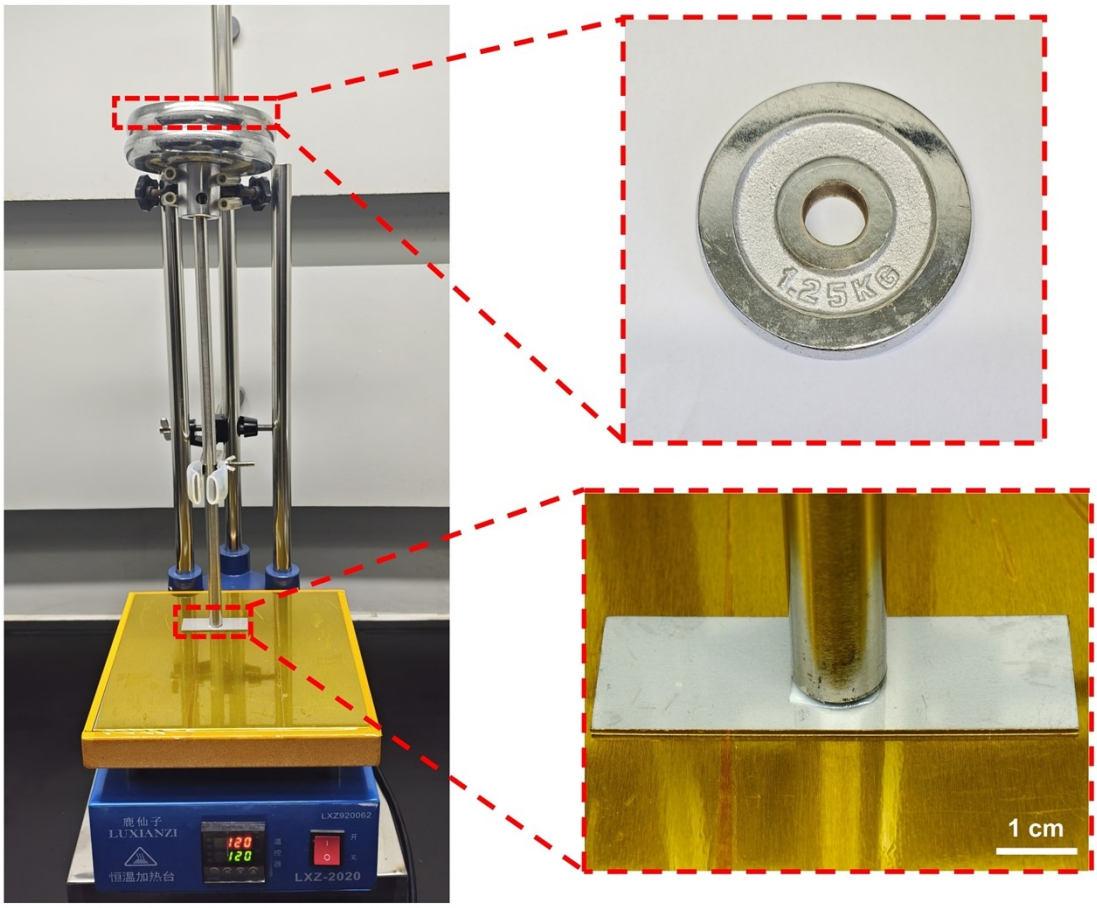

Fig. S12 The adhesive AB-P_{30} bonds the iron rod (mechanical arm) and the steel sheet that bear the weight of weight (goods) together through hot pressing.

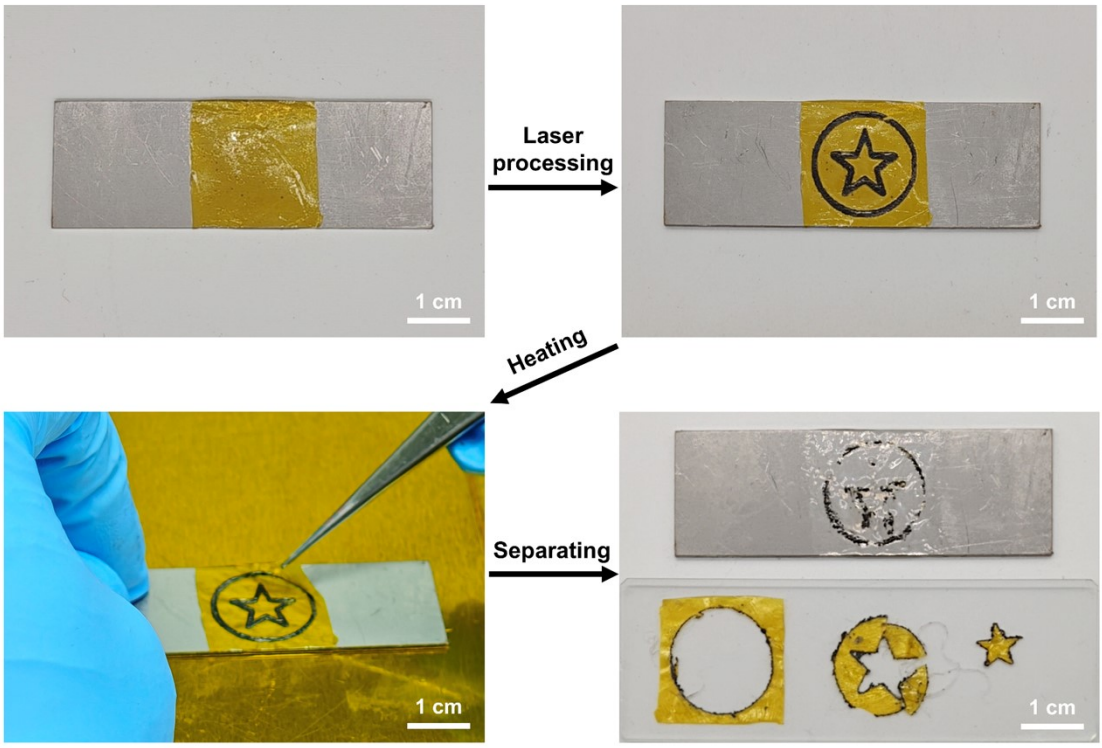

Fig. S13 Optical photos of the application of EVA hot-melt adhesive to temporarily fix polyimide film for laser patterned cutting and subsequent thermal removal process.

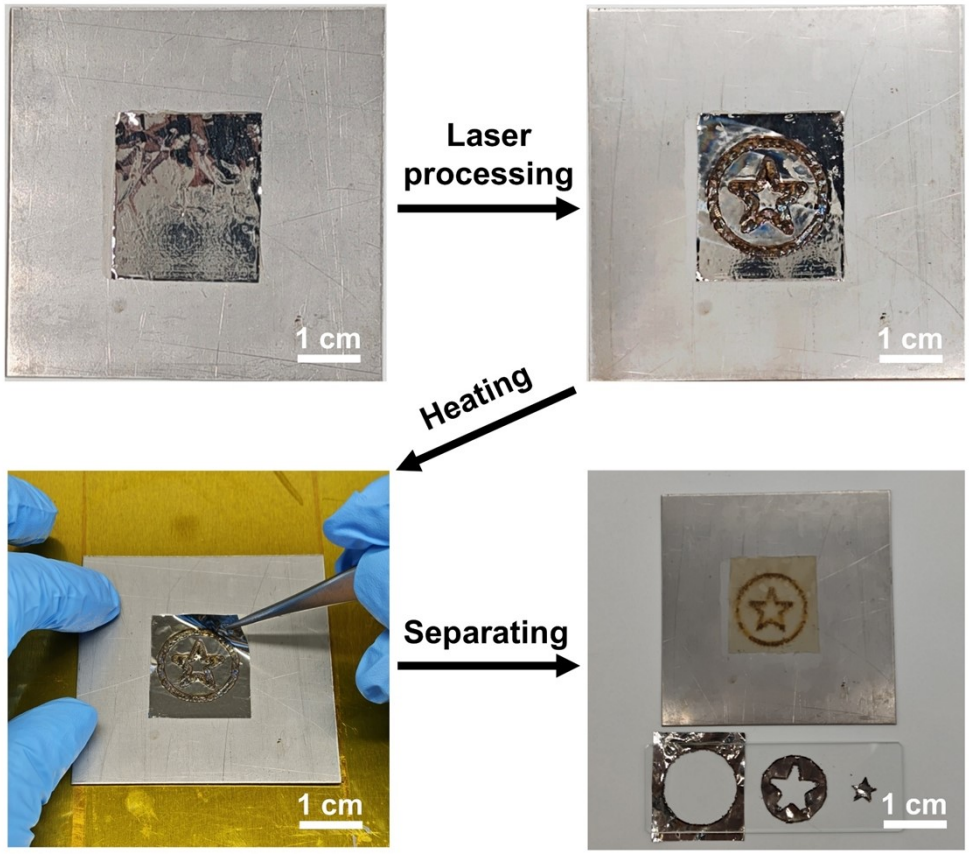

Fig. S14 Optical photos of the application of the AB-P_{30} adhesive to temporarily fixed thin stainless-steel sheet for laser patterned cutting and subsequent thermal removal process.

Supporting Table

Table S1 The molecular weight and dispersity of PPDL and PPDLDA.

Sample	M_n/g·mol^{-1}	M_w/g·mol^{-1}	Dispersity(M_w/M_n)
PPDL	3403	4863	1.43
PPDLDA	3604	4922	1.37

Table S2 Enthalpies and Temperatures of Melting and Crystallization of PPDL and PPDLDA.

Sample	T_m/°C	ΔH_m/J·g^{-1}	X_c/%	T_c/°C	ΔH_c/J·g^{-1}
PPDL	74.3	121.8	52.3	62.7	114.4
PPDLDA	75.1	123.6	——	61.7	116.0

Table S3 The crystallinity of PPDL, PPDLDA and the AB-P_x adhesives was obtained by analyzing their XRD curves through Jade software.

Sample	PPDL	PPDLDA	AB-P_0	AB-P_5	AB-P_{10}	AB-P_{20}	AB-P_{30}	AB-P_{40}
X_c/%	38	44	0	6	11	18	20	26

Table S4 The swelling degree and cross-linking density of the AB-P_x adhesives.

Sample	AB-P_5	AB-P_{10}	AB-P_{20}	AB-P_{30}	AB-P_{40}
Swelling degree (Q,%)	601	506	411	319	258
Cross-linking density (n×10^5, mol·cm^{-3})	2.3	3.7	6.7	14.5	29.3