Electronic Supplementary Material (ESI) for Soft Matter.

Supplementary Information

Malleable and self-healing rubbers covalently crosslinked by reversible boronic ester bonds

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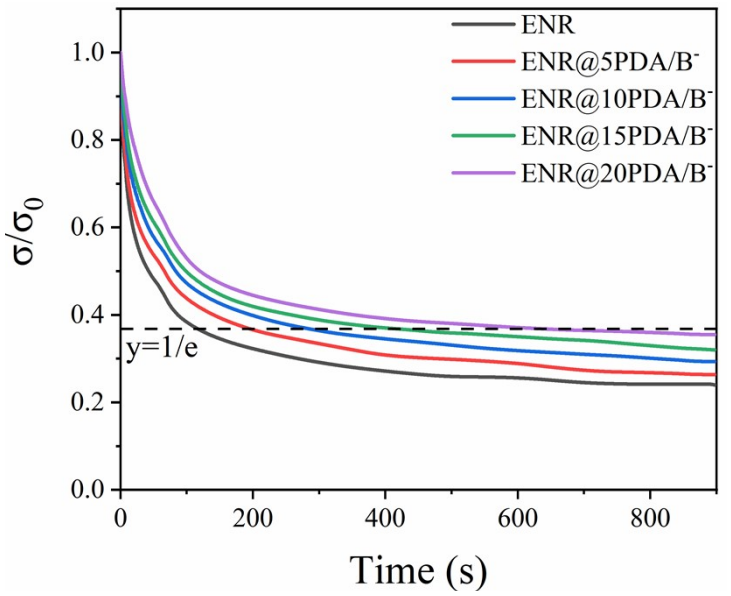

Figure S1 Stress relaxation curves of ENR and the crosslinked rubbers at 100℃.

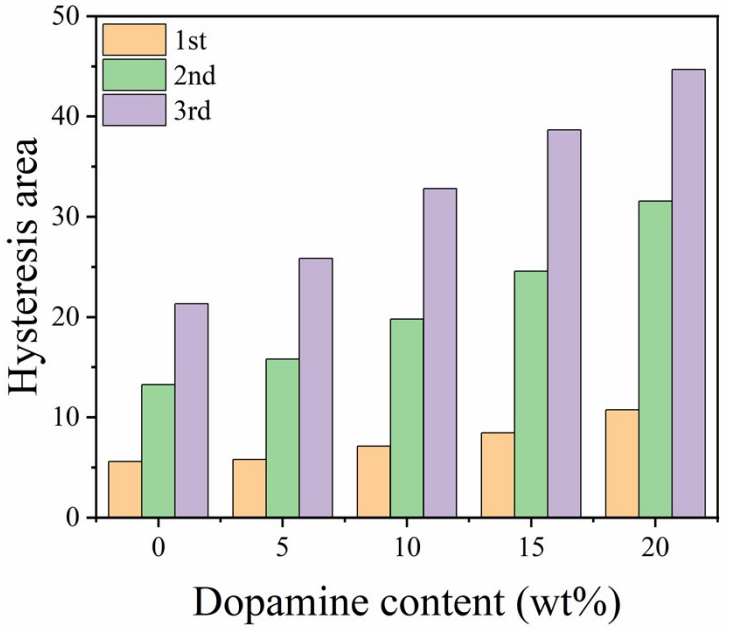

Figure S2 Hysteresis areas of ENR and the crosslinked rubbers.

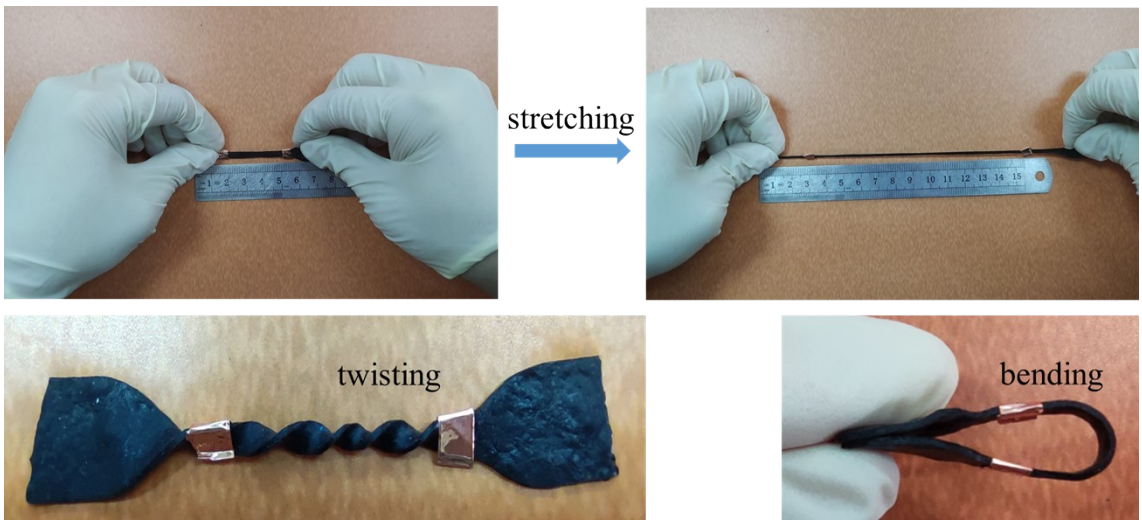

Figure S3 Photographs of the healed ENR@10PDA/B^- under external force.

Equilibrium swelling experiment

$$V_e = -\frac{1}{V}\left[\frac{\ln\left(1-V_r\right)+V_r+\chi {V_r}^2}{{V_r}^{\frac{1}{3}}-\frac{V_r}{2}}\right] \quad (1)$$

$$V_r = \frac{\frac{m_2}{\rho_1}}{\frac{m_2}{\rho_1}+\frac{m_1-m_2}{\rho_2}} \quad (2)$$

$$Swelling\ ratio = \frac{m_1-m_2}{m_2}\times 100\% \quad (3)$$

V_e——The cross-link density of ENR，mol/cm^3

V_r——The volume fraction of rubber in the swollen sample

χ——The Flory−Huggins polymer−solvent interaction term（0.393）

V——The molar volume of toluene（106.2 cm^3/mol）

ρ_1——The densities of rubber（0.94g/cm^3）

ρ_2——The densities of toluene（0.865g/cm^3）

m_1——The mass of the swollen sample

m_2——The mass of the dried rubber

Logarithmic form of Arrhenius formula

$$ln\left(\tau\right) = ln\left(\tau_0\right) + \frac{E_a}{RT}$$

τ ——The relaxation time of the crosslinked rubber (s)

τ_0——The characteristic relaxation time at infinite temperature

R ——The universal gas constant (8.314 J/(mol·K))

T ——The testing temperature (Thermodynamic temperature, K)

E_a ——The activation energy of the crosslinked rubber (kJ/mol)