International Association of Chinese Infrastructure Professionals

Study on performance of a novel single-component epoxy resin pavement sealant

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Low Carbon Technologies and Resilience for Long-Lasting Infrastructure

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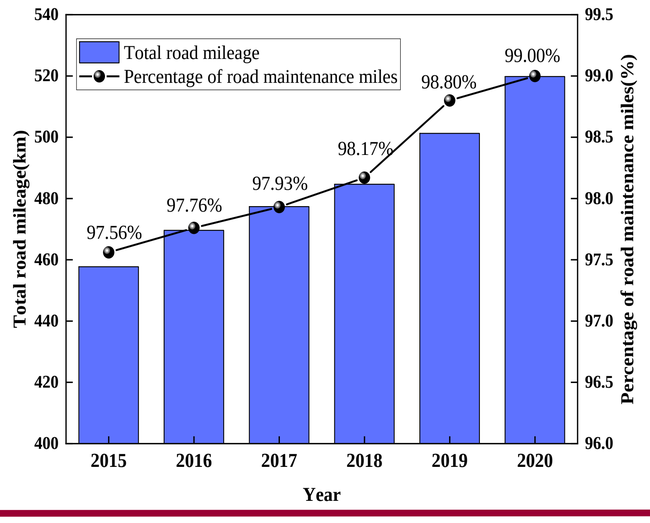
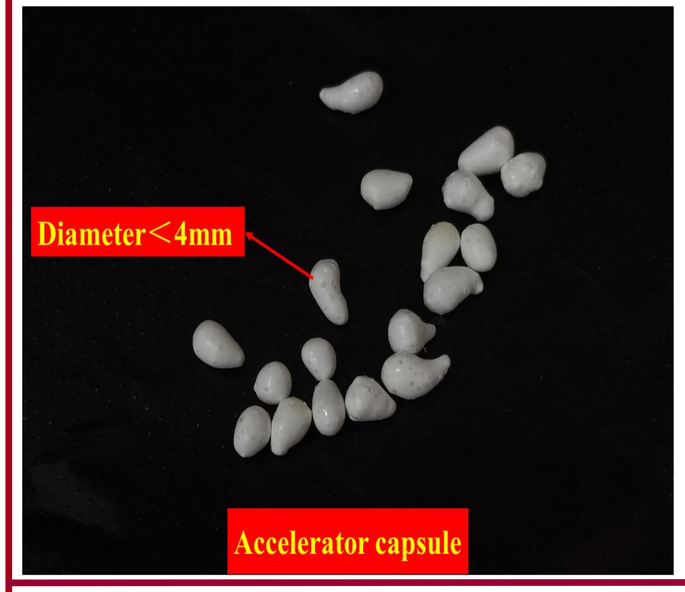
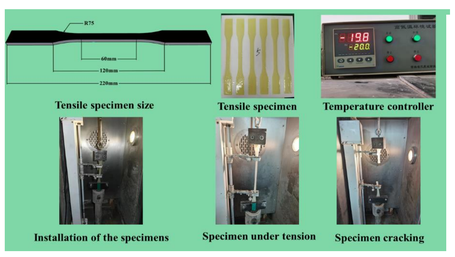


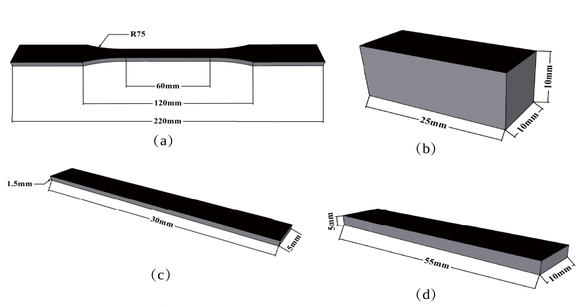
Introduction

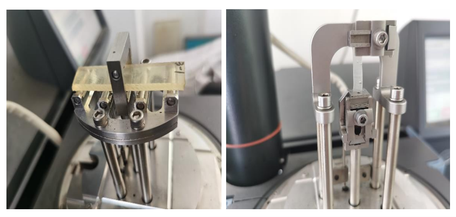
- The task of road maintenance in China is enormous.
- Asphalt-based grouting adhesive is prone to failure, while the two-component epoxy resin grouting adhesive is inconvenient to use and other shortcomings.

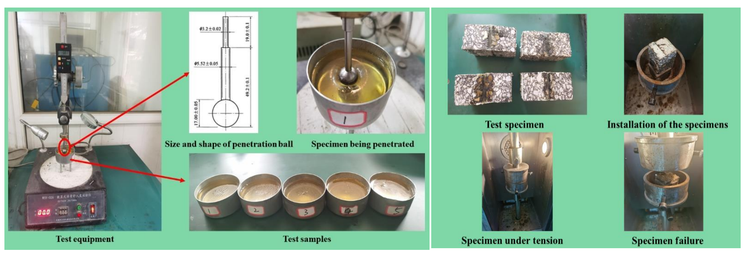


Materials and Methods

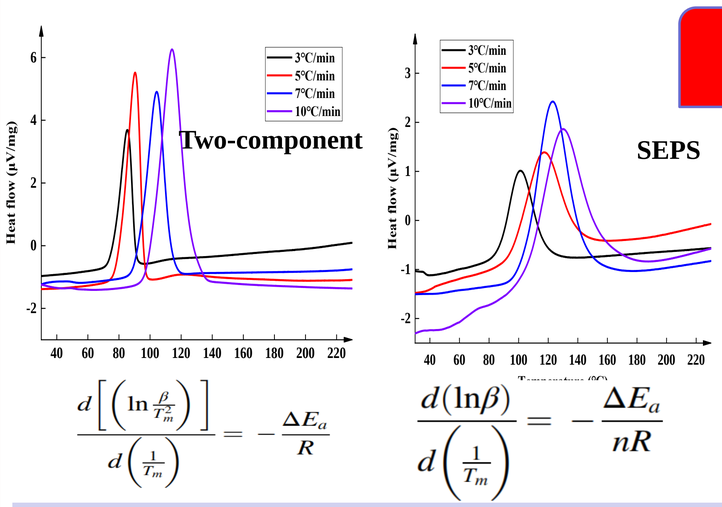






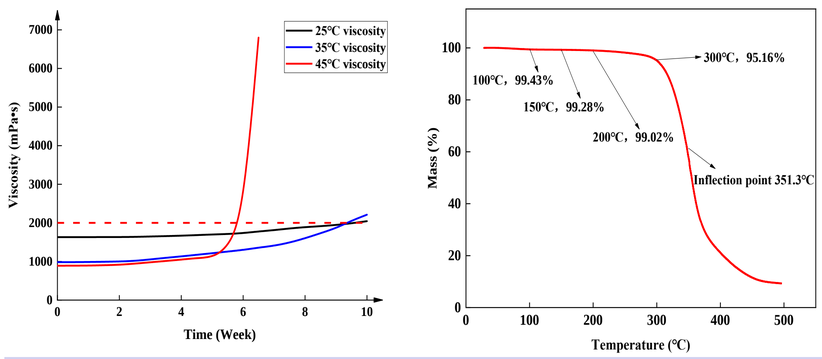


Results and Discussion

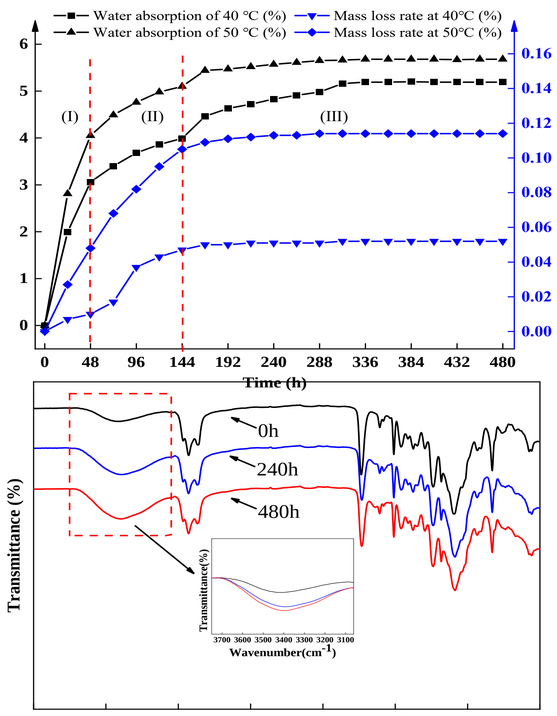


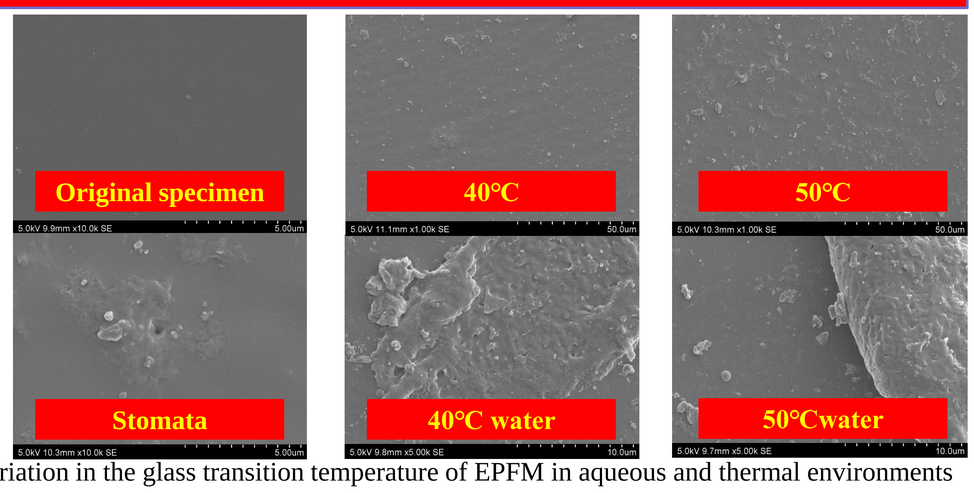
$$\frac{d\left[\left(\ln\frac{\beta}{T_m^2}\right)\right]}{d\left(\frac{1}{T_m}\right)} = -\frac{\Delta E_a}{R} \qquad \frac{d(\ln\beta)}{d\left(\frac{1}{T_m}\right)} = -\frac{\Delta E_a}{nR}$$

- The reaction orders of the two-component and SEPS can be calculated as 0.72 and 0.87, which are similar to the first-order reaction.



- SEPS has good storage stability under the conditions of 25-35℃.
- The SEPS-cured product has good thermal stability and meets the requirements of use.

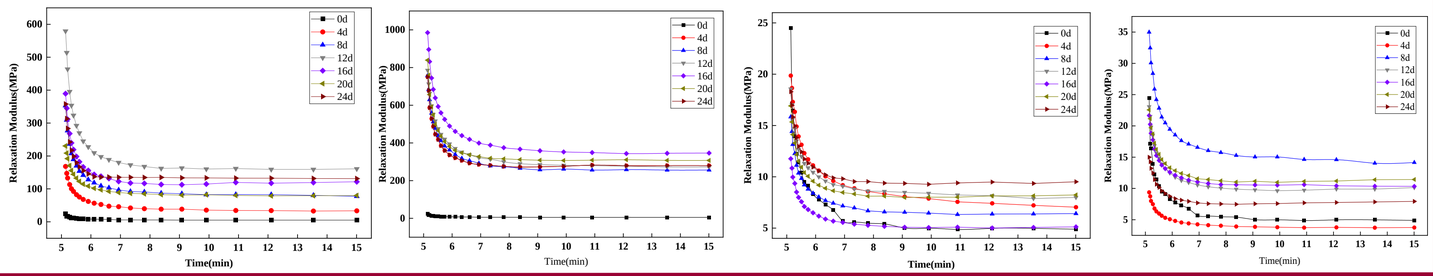




Variation in the glass transition temperature of EPFM in aqueous and thermal environments

Time / Condition	0d	4d	8d	12d	16d	20d	24d
40℃	-9.62	-2.73	-1.38	-0.58	1.18	1.23	2.12
50℃	-9.62	1.11	1.38	1.62	1.98	2.67	3.39
40℃ water	-9.62	-14.04	-14.58	-17.50	-18.45	-18.86	-18.99
50℃ water	-9.62	-13.59	-17.14	-17.51	-17.77	-18.25	-19.14

Stress relaxation performance



Conclusion

1. **Under normal temperature conditions, SEPS has a long storage stability period and is a primary curing reaction. It also has excellent thermal stability.**
2. **The water absorption of SEPS can be divided into three stages, SEM images show that the surface of the EPFM does not produce cracks under the swelling stress of water.**
3. **The hydrolysis of SEPS is not significant under the effect of hydrothermal coupling.**
4. **The glass transition temperature of SEPS increases in a hot environment and decreases in a water environment.**
5. **Compared with the thermal environment, water can further weaken the stress relaxation performance of the SEPS.**