

Wood Modification with Maleic Anhydride and Sodium Hypophosphite

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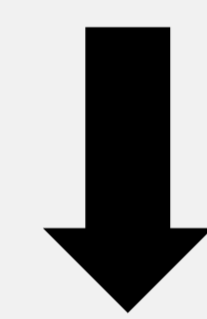
Background

Previous Studies Showed

Maleic anhydride (MA) treatment on wood can improve

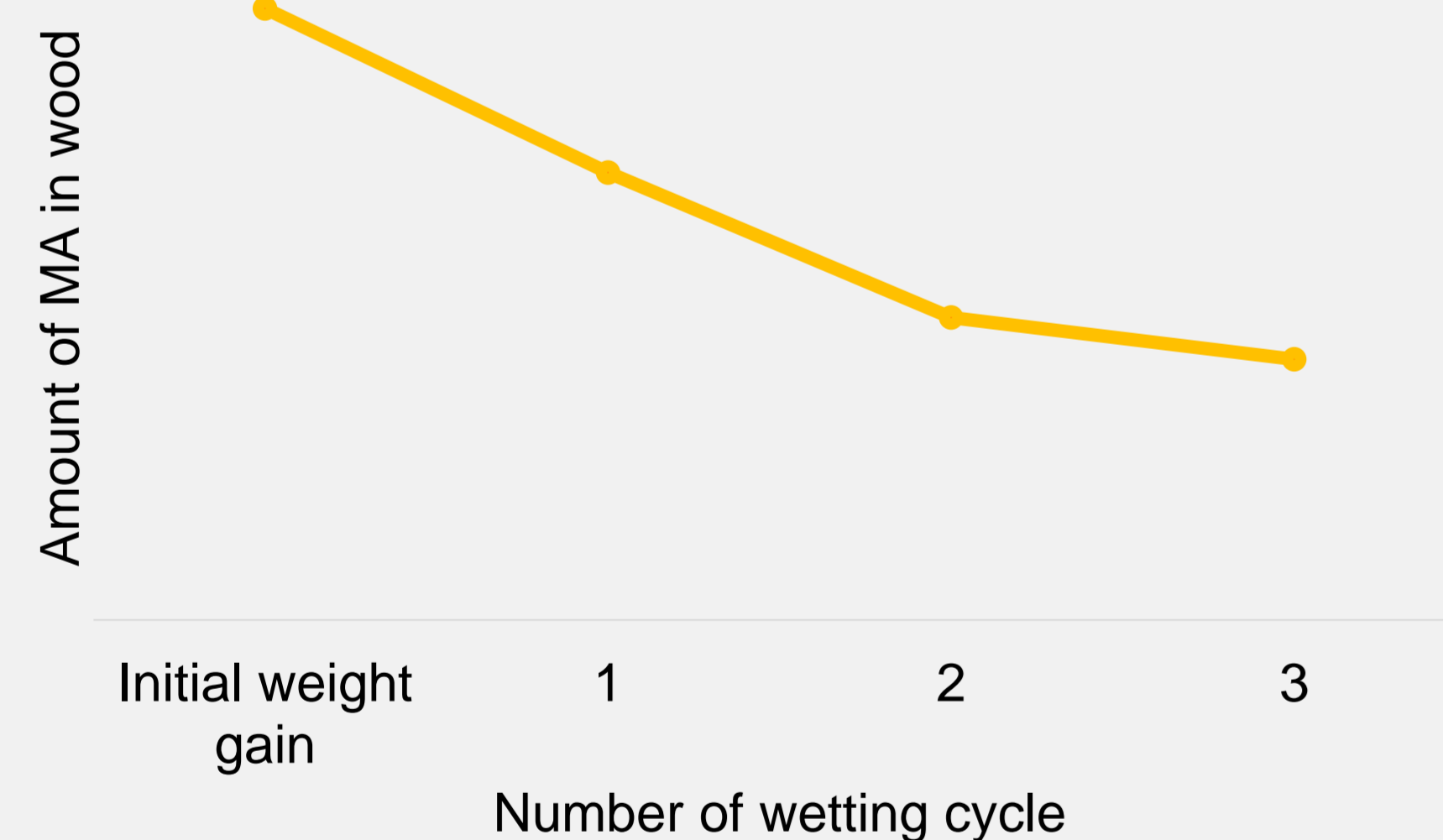
- Dimensional Stability
- Biological Durability

Matsuda et al. 1988, Iwamoto and Itoh 2005

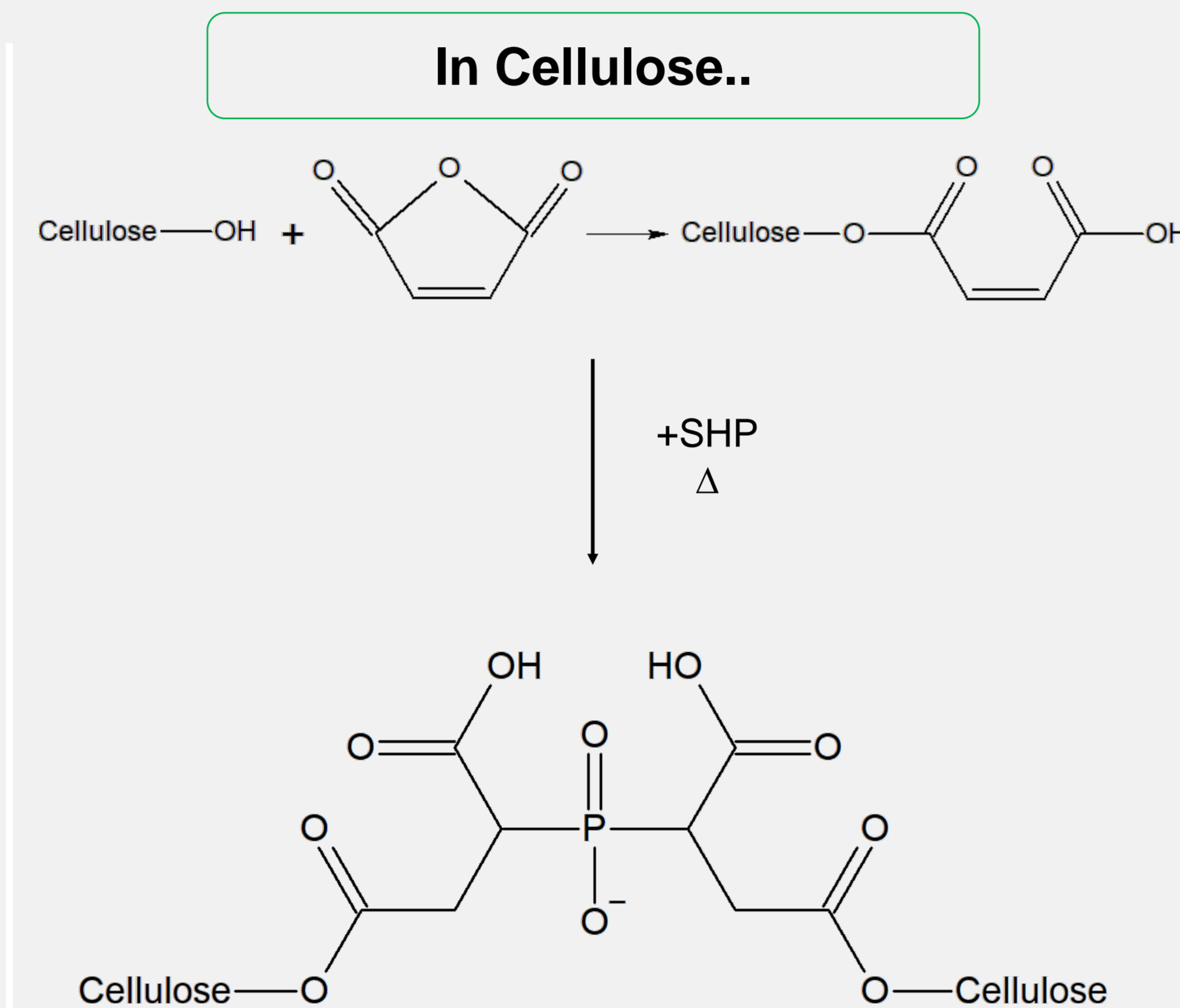


The Problem

MA is not stable in wood



Can we apply MA with SHP to obtain a stable cross-linking?



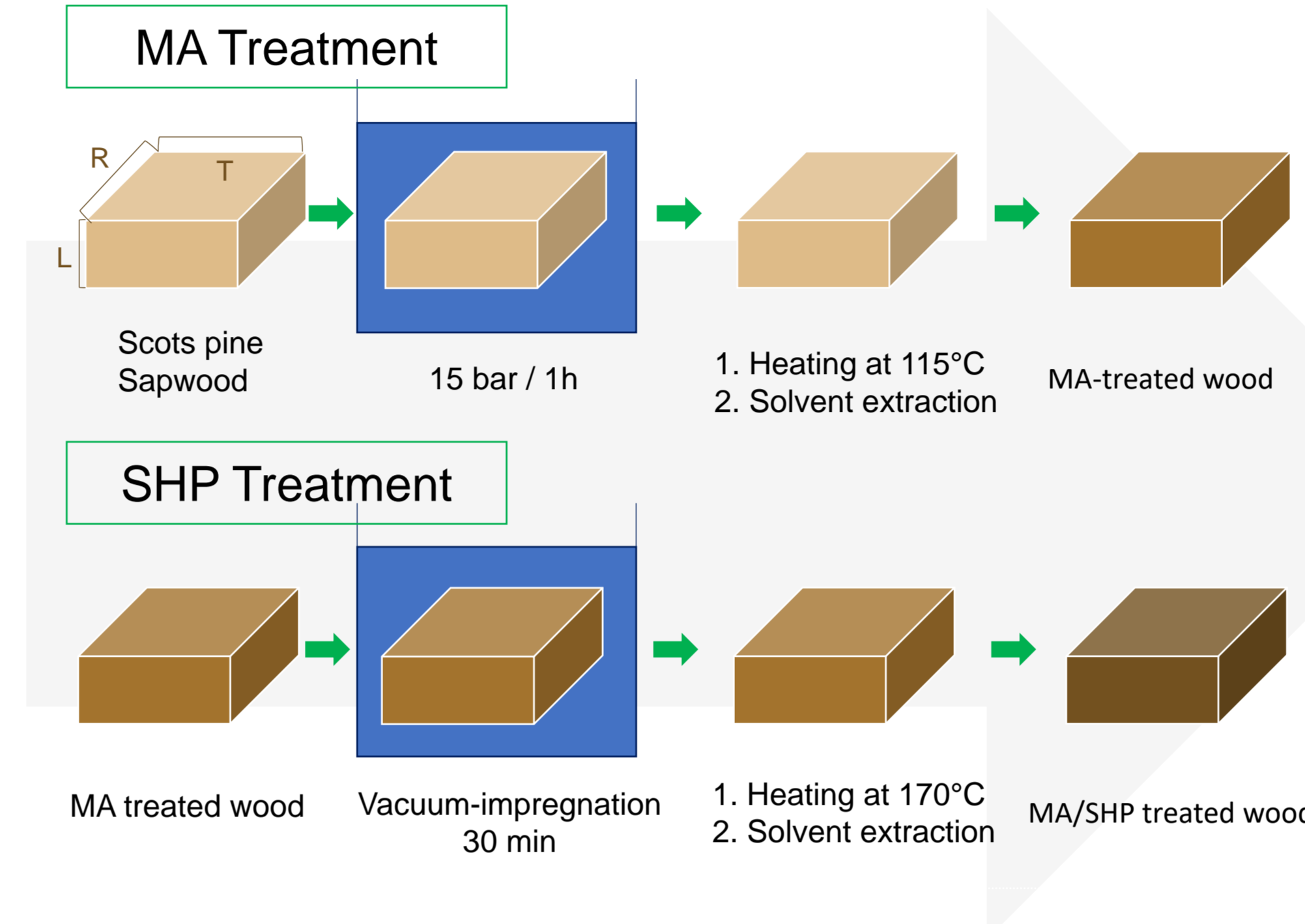
A cross-linking between cellulose can be achieved by treating with MA and sodium hypophosphite (SHP)

By treating MA&SHP:

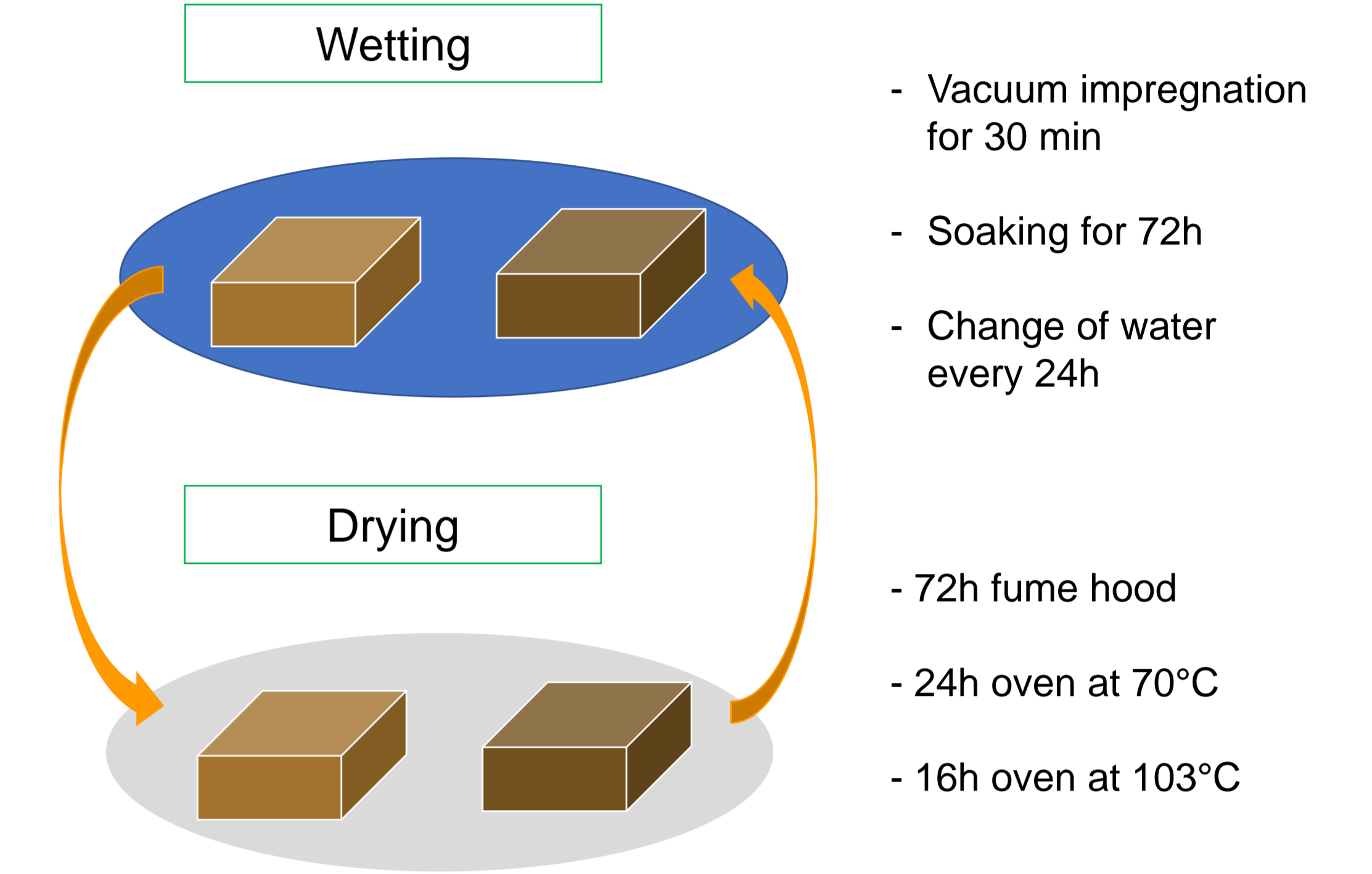
- Wrinkle resistance and fire retardance of cotton were enhanced.
- Shape recovery of cellulose nanofibril aerogel was enhanced.

Experimental

Wood Modification

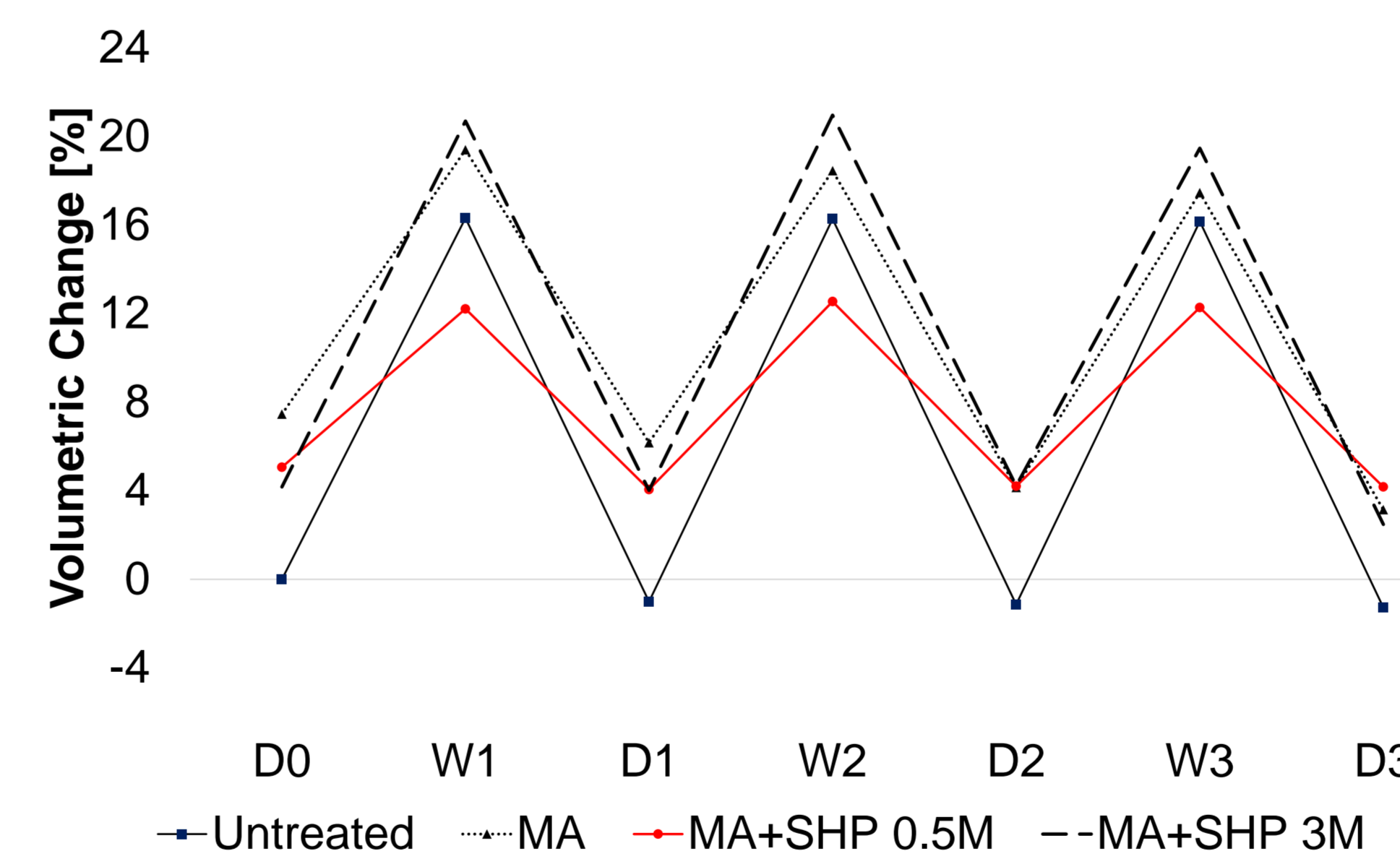


Wet-dry Cycle



Results & Discussions

Addition of small amount of SHP increased dimensional stability by formation of cross-linking



- Pre-bulking at dry state after treatment (D0) in all samples
- Samples treated with MA and small amount of SHP (red) showed least wet volume.
- Formation of cross-linking in the sample "MA+SHP 0.5M" possible

SHP stabilized the agents in wood

Treatment	After treatment	1 st cycle	2 nd cycle	3 rd cycle
MA	19.0	13.9	9.4	8.1
MA+SHP 0.5M	11.2	9.9	9.1	8.6
MA+SHP 3M	10.0	8.1	6.7	4.6

The WPG of "MA+SHP 0.5M" showed least change, which might indicate stabilization of treatment during wet-dry cycles.

Conclusion

- The result indicate possible cross-linking in cell wall treating with MA and SHP resulting leach resistance and dimensional stability.
- The treatment with MA and SHP could provide new wood product which can be used outdoors.
- To develop this modification system to product, further research on other properties is needed.