Controlling formation and properties of cellulose nano-paper using polyvinylpyrrolidone / laponite nanoparticle system

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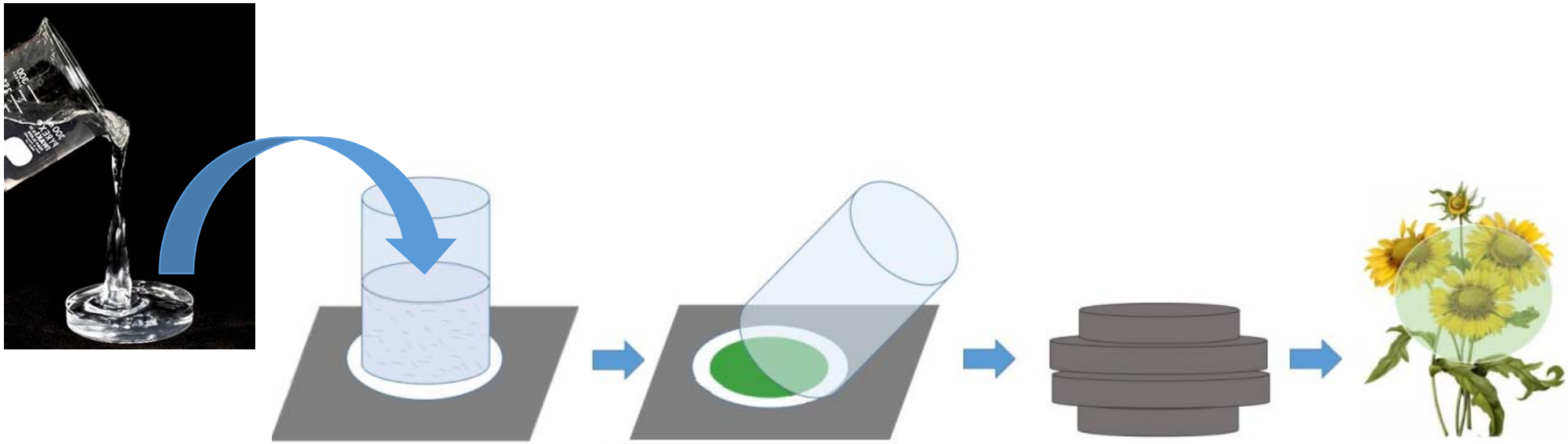
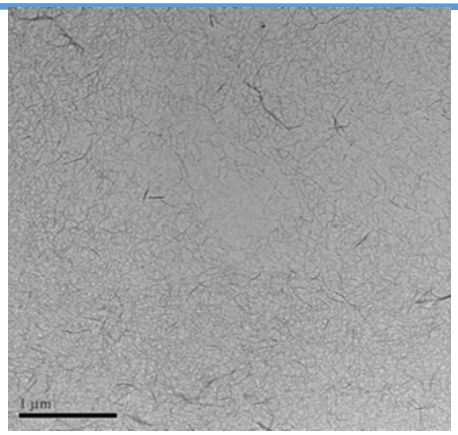
Introduction



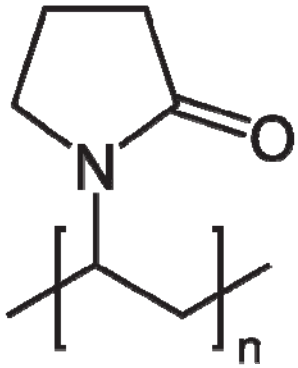
vacuum-filtration formability

hot-press drying

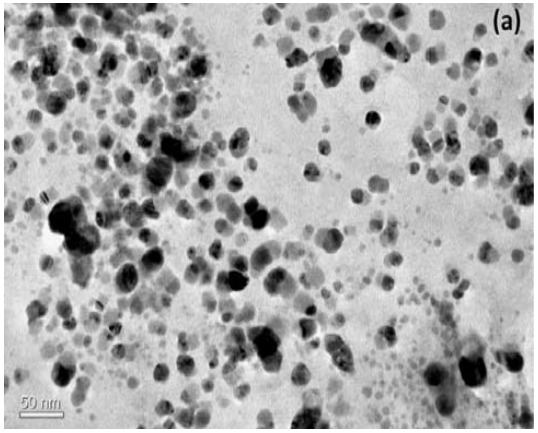
Experimental details



Cellulose Nano-fiber



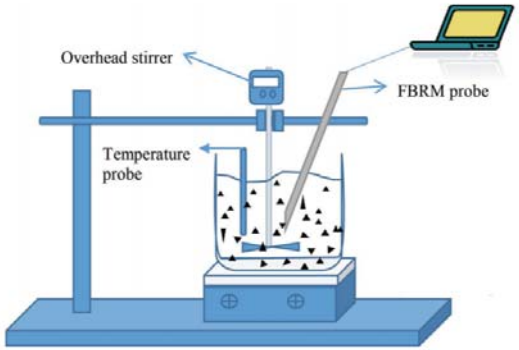
Polyvinylpyrrolidone (PVP)



Laponite

Experimental details

Filtrate Time



Flocculation measurement

Transparency and Haze

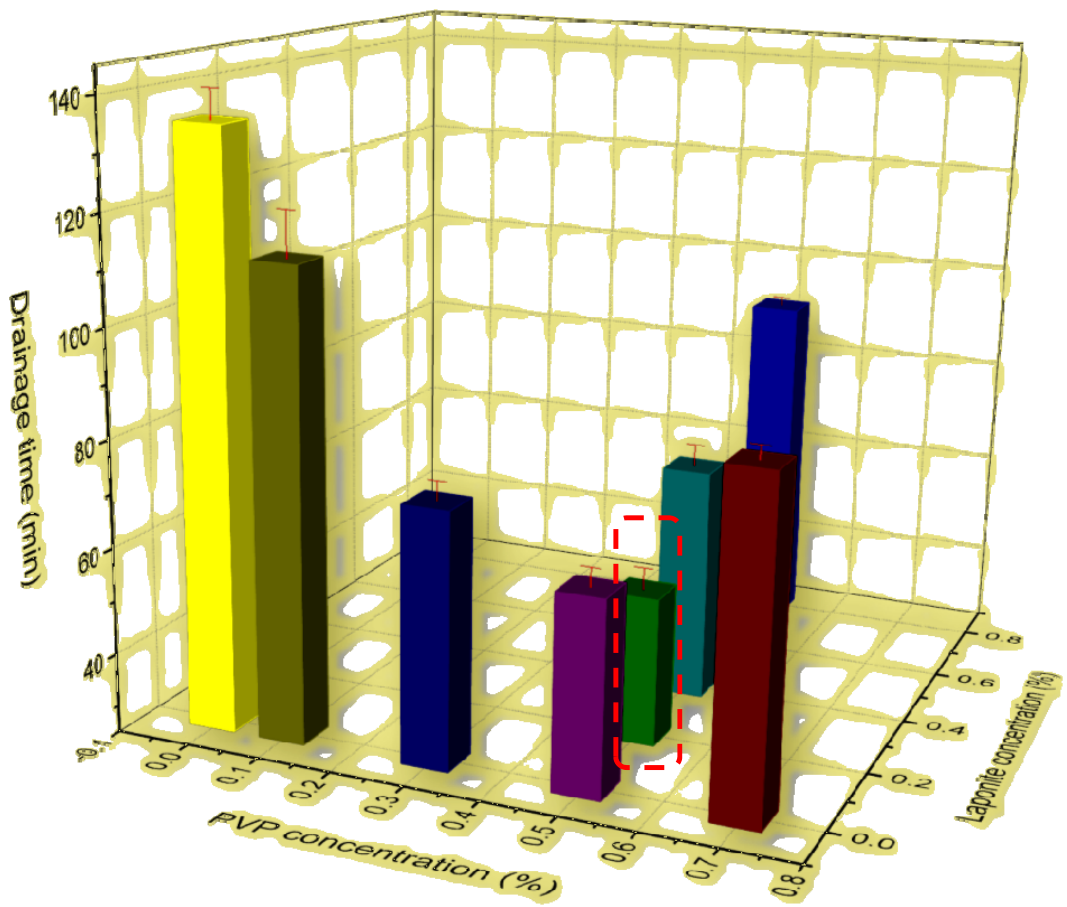
AFM

Tensile tests

Dynamic Mechanical Analyzer

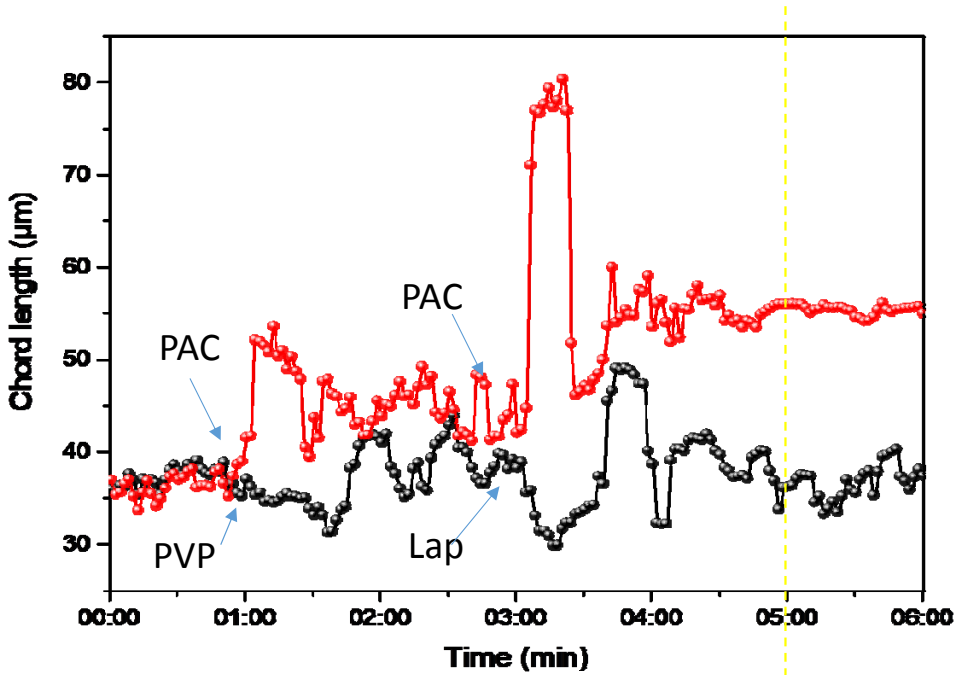
Results and Discussion

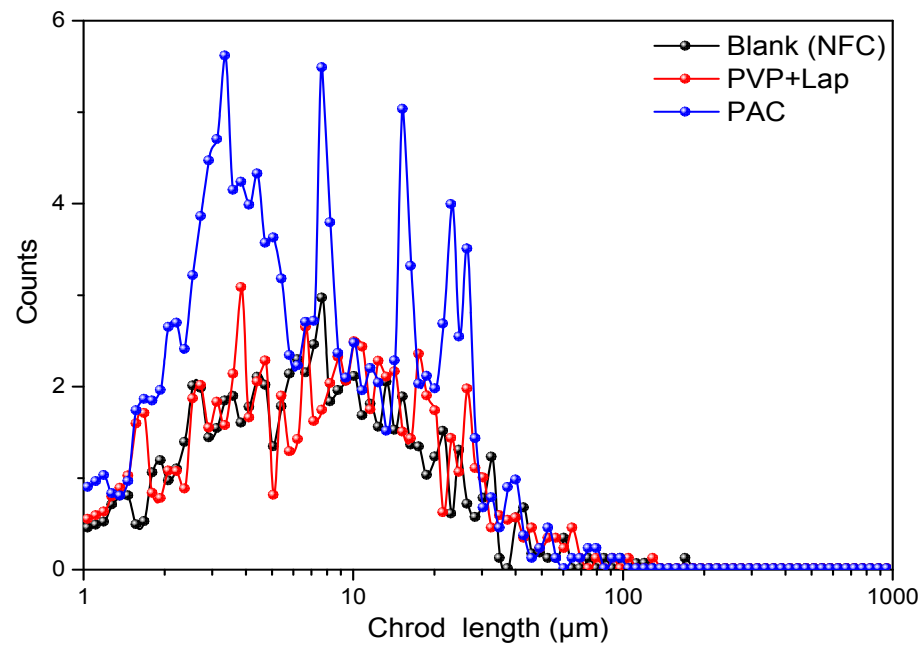
1. Filtrate Time



Results and Discussion

2. Flocculation measurement

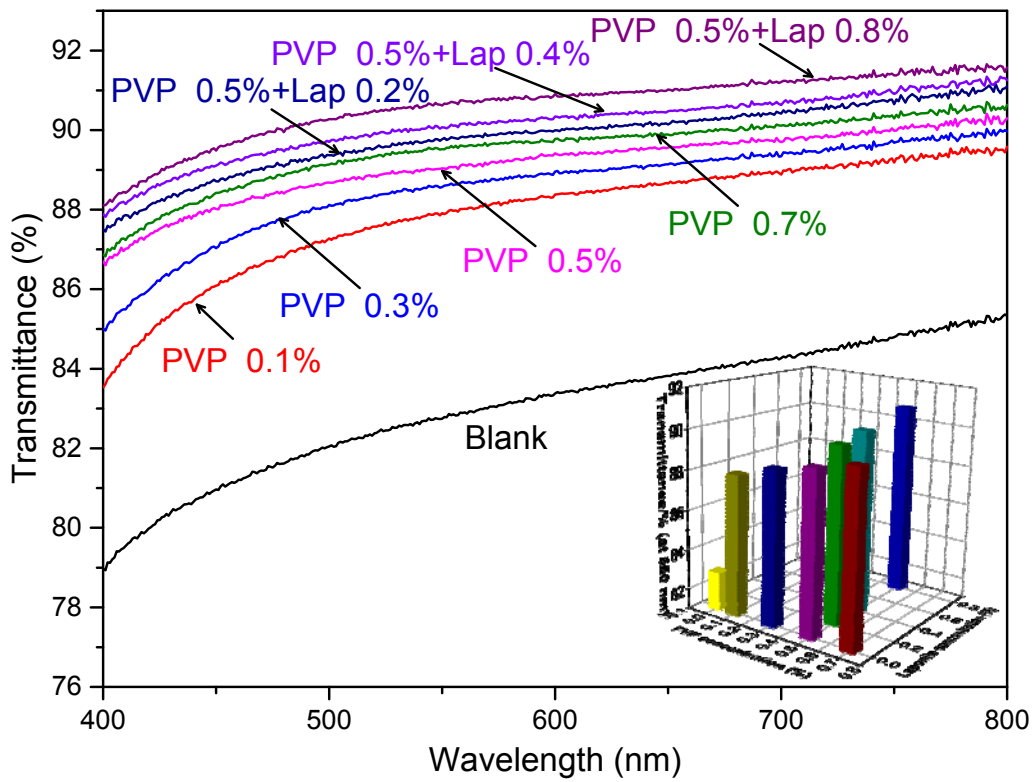




FBRM(Focused Beam Reflectance Measurement)

Results and Discussion

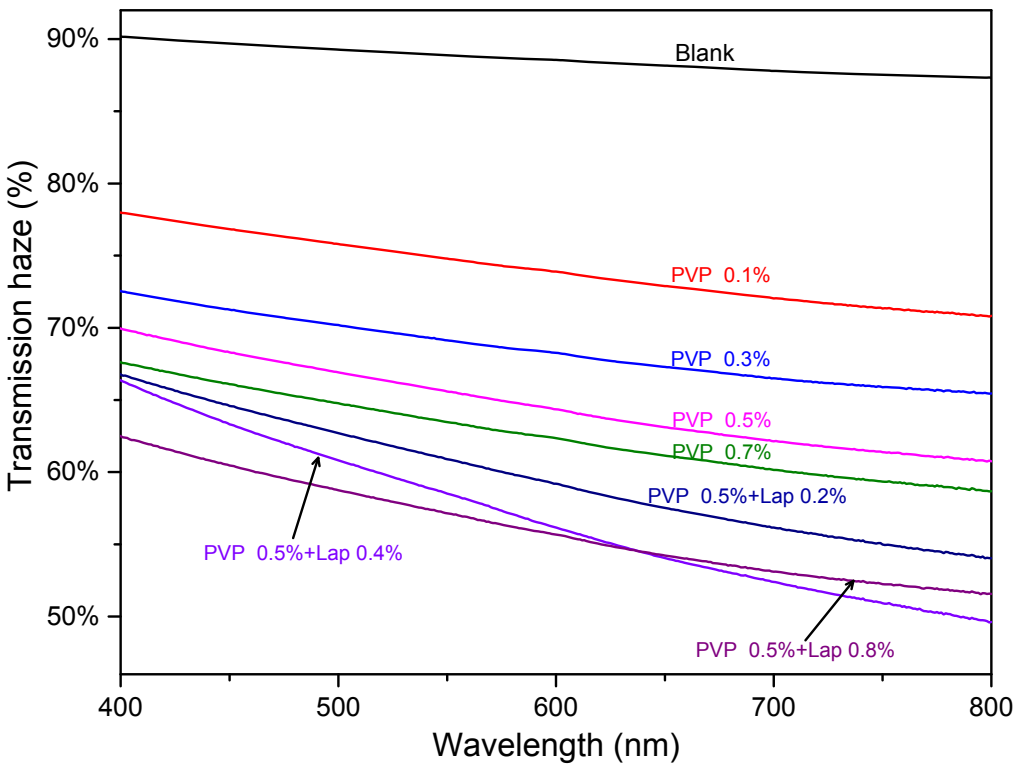
3.Transmittance



PVP 0.5%+Lap 0.4%

Results and Discussion

4. Haze



PVP 0.5%+Lap 0.4%

Results and Discussion

5. Surface morphology

Blank

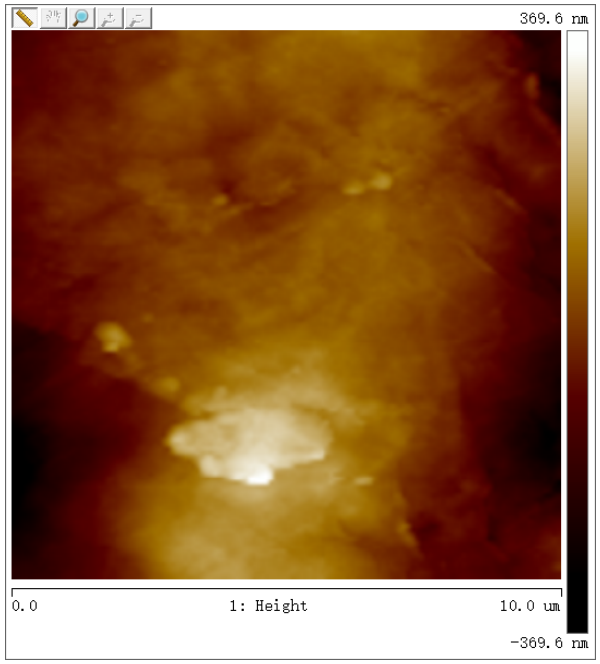


Image Rq	106 nm
Image Ra	82.0 nm

PVP

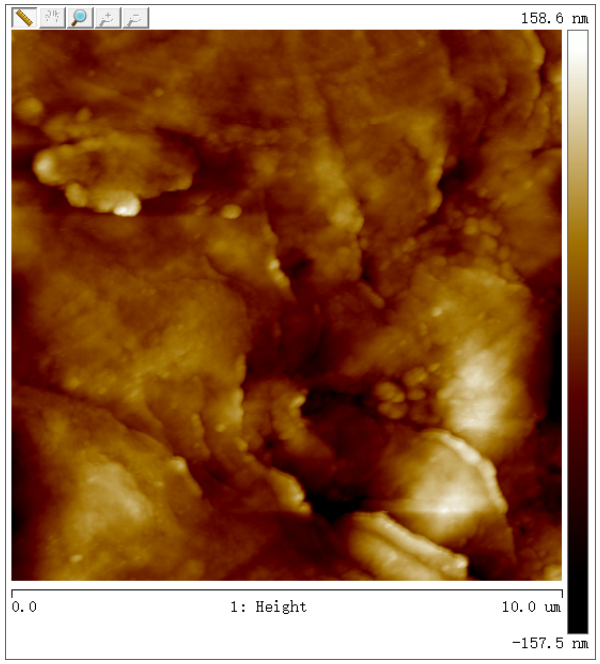


Image Rq	40.0 nm
Image Ra	29.3 nm

PVP+Lap

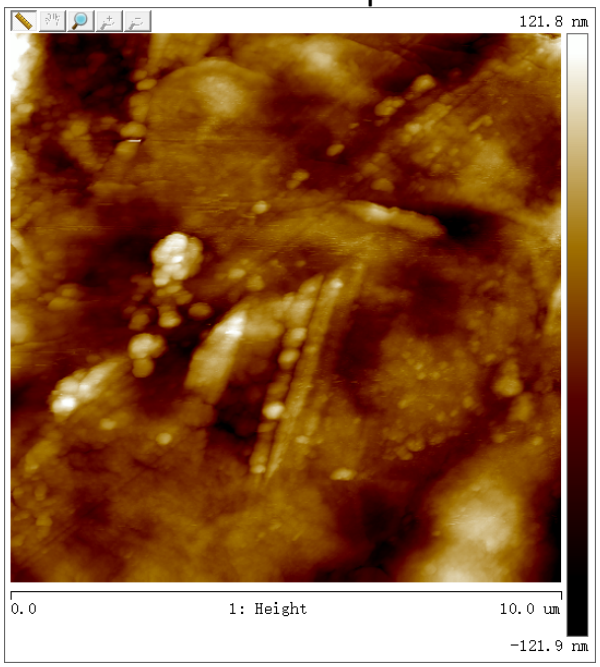
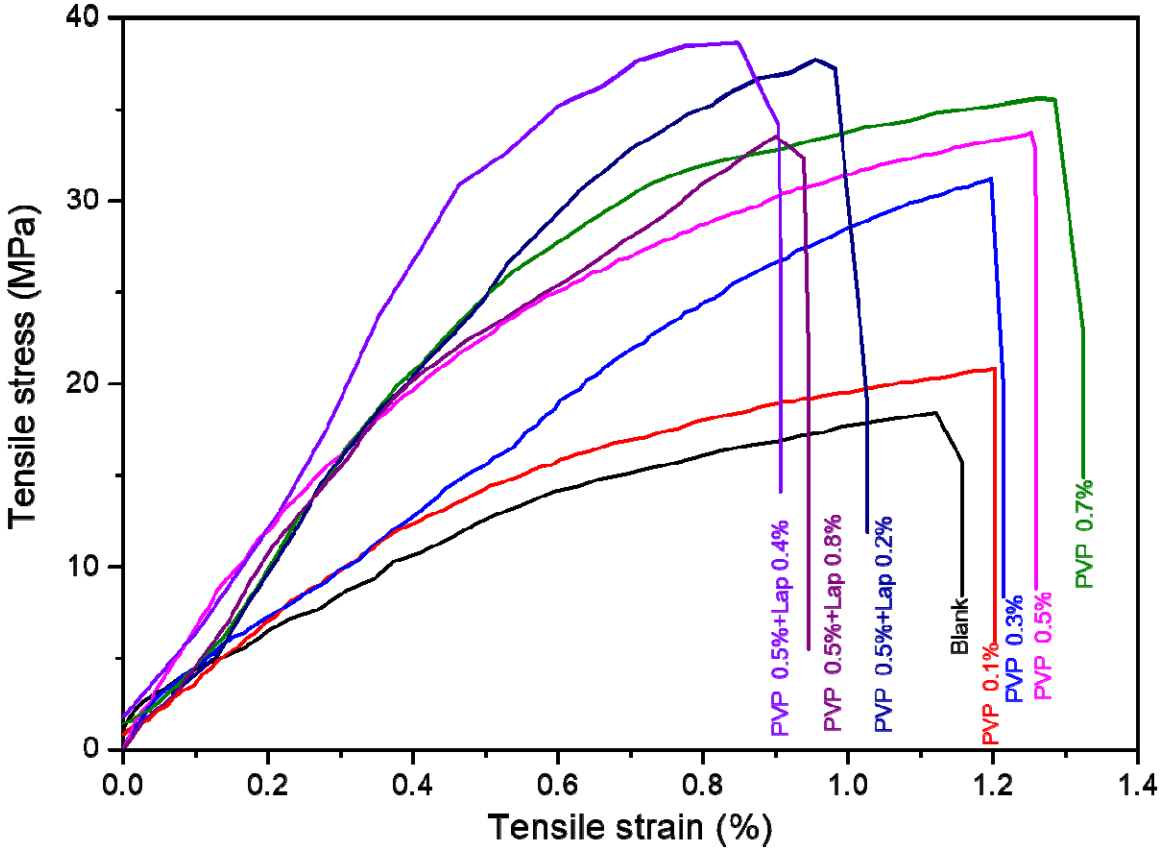


Image Rq	32.6 nm
Image Ra	25.0 nm

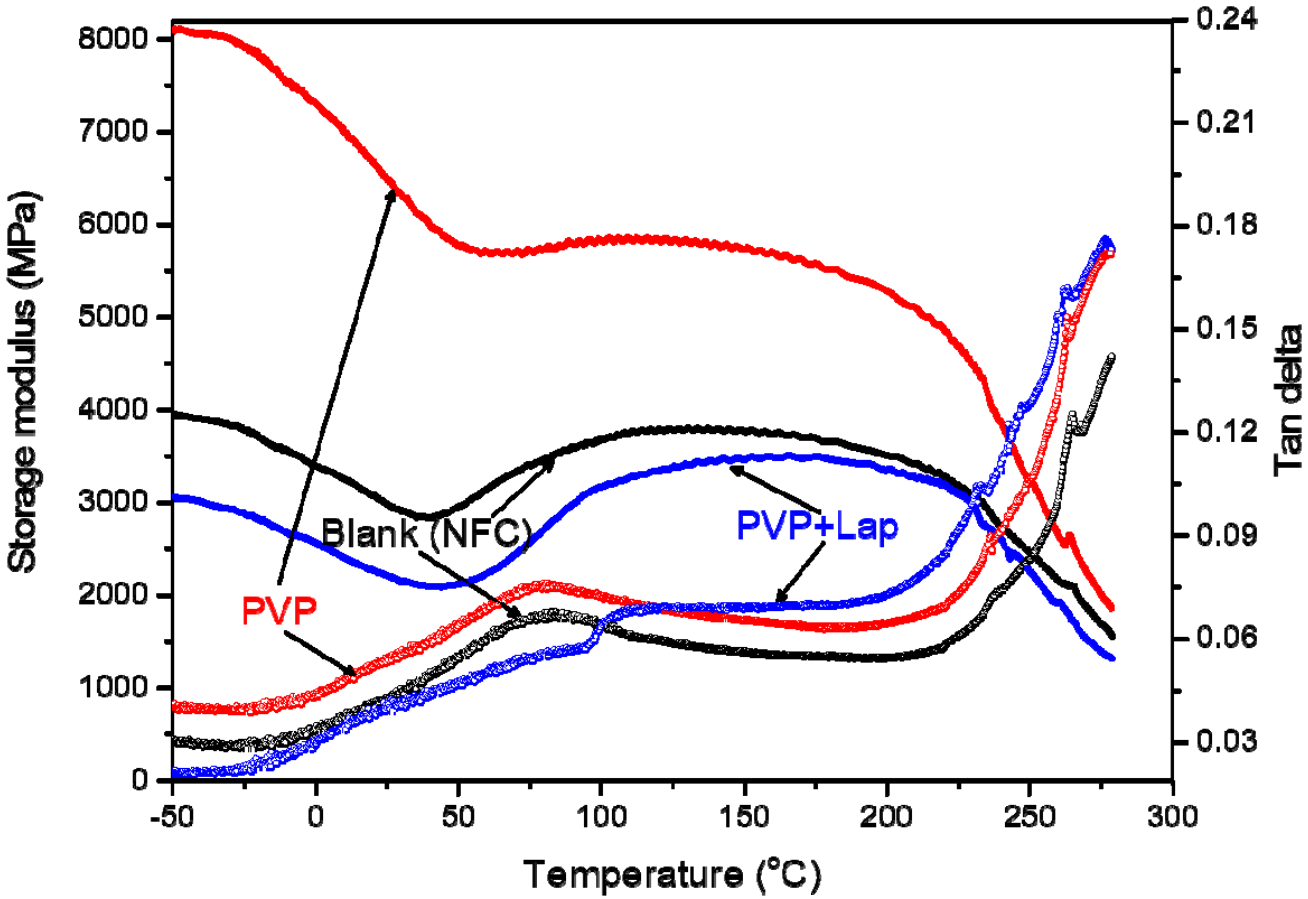
Results and Discussion

6. Stress-Strain



Results and Discussion

7. Dynamic mechanical analysis (DMA)



Conclusions

- The PVP/laponite nanoparticle system reduced the dewatering time and improved the formation of cellulose nano-paper.

- The PVP/laponite nanoparticle system didn't induce excessive flocculation of cellulose nano-fiber.

- The cellulose nano-paper made with the PVP/laponite nanoparticle system shows higher transparency, haze, smoothness and tensile strength than control samples.

Acknowledgments

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Thank you

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