

Formulating adhesives with aminated polyolefins for low surface energy substrate

Z. Zhang¹, B.M. Yavitt^{1,2,3}, B. Kaur², D.J. Gilmour^{2,4}, L.L. Schafer², S.G. Hatzikiriakos¹

¹ Department of Chemical and Biological Engineering, University of British Columbia, Vancouver, B.C, Canada, V6T 1Z3

² Department of Chemistry, University of British Columbia, Vancouver, B.C, Canada, V6T 1Z1

³ Department of Chemical Engineering, University of Cincinnati, Cincinnati, OH, USA

⁴ a2o Advanced Materials Inc., Vancouver, B.C, Canada, V6T 1Z1

ABSTRACT

Non-polar polyolefins are catalytically functionalized with amine substituents to yield polar polymers with dynamic associative interactions¹. Aminated polyolefins (APO) display self-healing ability and impressive adhesive properties on many commodity polyolefins and poly(tetrafluoroethylene) (PTFE)¹. The potential for APO to be used as an adhesive material is limited by its low mechanical strength. The addition of commercial polyolefin tackifiers is found to increase the mechanical properties while maintaining the unique properties of APO. APO was blended with additive at different mass ratios. Rheological, mechanical and adhesion properties of the formulations were collected to gain insight into the wide parameter space and the impact of polymer chain dynamics on the adhesive performance. Potential candidates for general-use of these hot-melt adhesive systems were selected based on the optimized rheology, mechanical and adhesive results.

REFERENCES

- (1) Gilmour, D. J.; Tomkovic, T.; Kuanr, N.; Perry, M. R.; Gildenast, H.; Hatzikiriakos, S. G.; Schafer, L. L. Catalytic Amine Functionalization and Polymerization of Cyclic Alkenes Creates Adhesive and Self-Healing Materials. *ACS Appl. Polym. Mater.* **2021**, *3* (5), 2330–2335. <https://doi.org/10.1021/acspm.1c00158>.