Bibliography

- B.S. Chemistry & Engineering from Clark Atlanta University until 1998
- B.S. in Chemical Engineering from the Georgia Institute of Technology 1999
- Ph.D. at MIT in Chemical Engineering and the Program in Polymer Science and Technology in 2005
    - Under Prof. Paula T. Hammond
    - Polyurethane materials’ properties
- Recipient of the Provost’s Academic Diversity Postdoctoral Fellowship at Cornell in 2007, where she completed a two-year postdoctoral appointment in the Department of Chemical and Biomolecular Engineering.

Independent Career

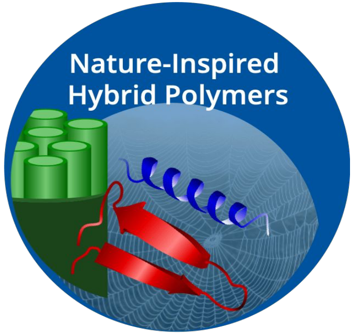
- Climo Associate Professor in the Department of Macromolecular Science and Engineering at Case Western Reserve University from 2007
- She led the National Science Foundation Center for Layered Polymeric Systems
- She returned to Massachusetts Institute of Technology in 2015 as a Martin Luther King Visiting Scholar.
- In 2018 Korley joined the University of Delaware as a Distinguished Professor in the Department of Materials Science and Engineering and Chemical and Biological Engineering.
- At the University of Delaware Korley is Principal Investigator for the National Science Foundation Partnerships for International Research and Education (PIRE).
- Appointed U.S. Science Envoy by Secretary of State 2023

CASE WESTERN RESERVE UNIVERSITY

Massachusetts Institute of Technology

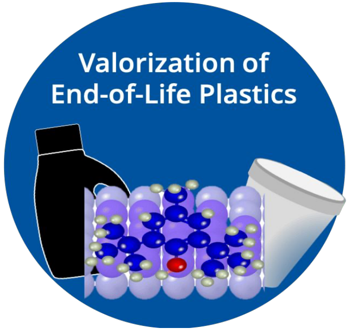
UNIVERSITY OF DELAWARE

Korley Research Group



Nature's material (spider silk, wood, seed pods) as models for new modular materials that respond to external stimuli and are constructed from limited building blocks

Uses architectural features to design functional, responsive, and adaptable polymeric materials



Chemical deconstruction and upgrading of plastic waste as a means to achieve circularity in the plastics' lifecycle

Combining valorization efforts with an understanding of polymer chemistry with complex thermal, mechanical, and physical properties, for the development of next-generation materials towards a circular plastics economy.

Bio-derived polymers can be used as a potential replacement for petrochemical derived options for development of new materials

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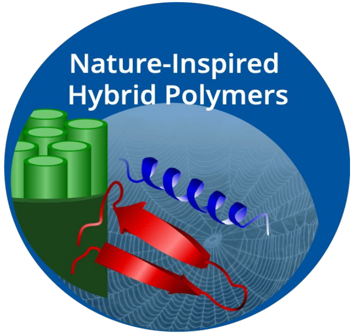

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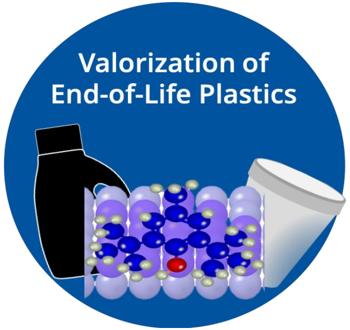

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Characterizing HDPE Hydrocracking Catalyst Poisoning by Antioxidant Additives

Pt/WO3/ZrO2 hydrocracking catalyst was developed for polyethylene deconstruction.

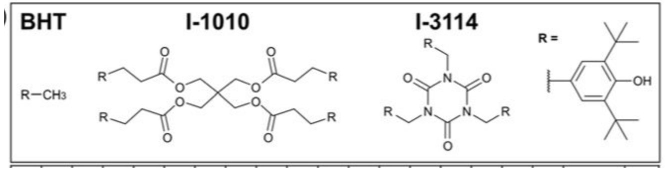
Both Pt metal sites and acidic sites on catalyst must be active, and their ratio (Pt/WO3/ZrO2 composition) affects product distributions (Metal Acid Balance, MAB)

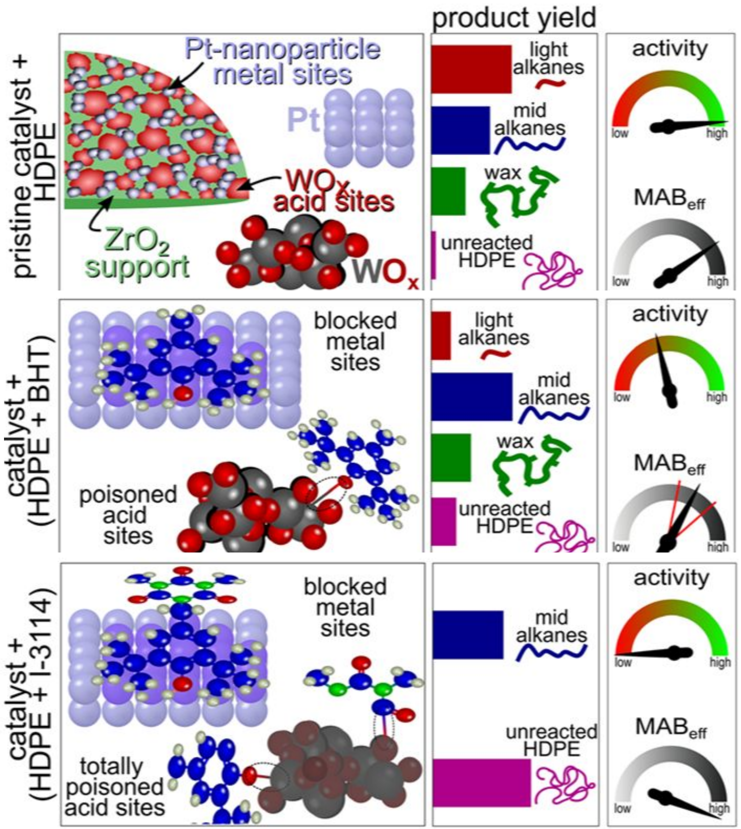
Common additives in HDPE lower catalyst activity and changing product distributions

Catalyst + pure HDPE

BHT additive lowers reactivity

Cyanuric acid based additive kills activity





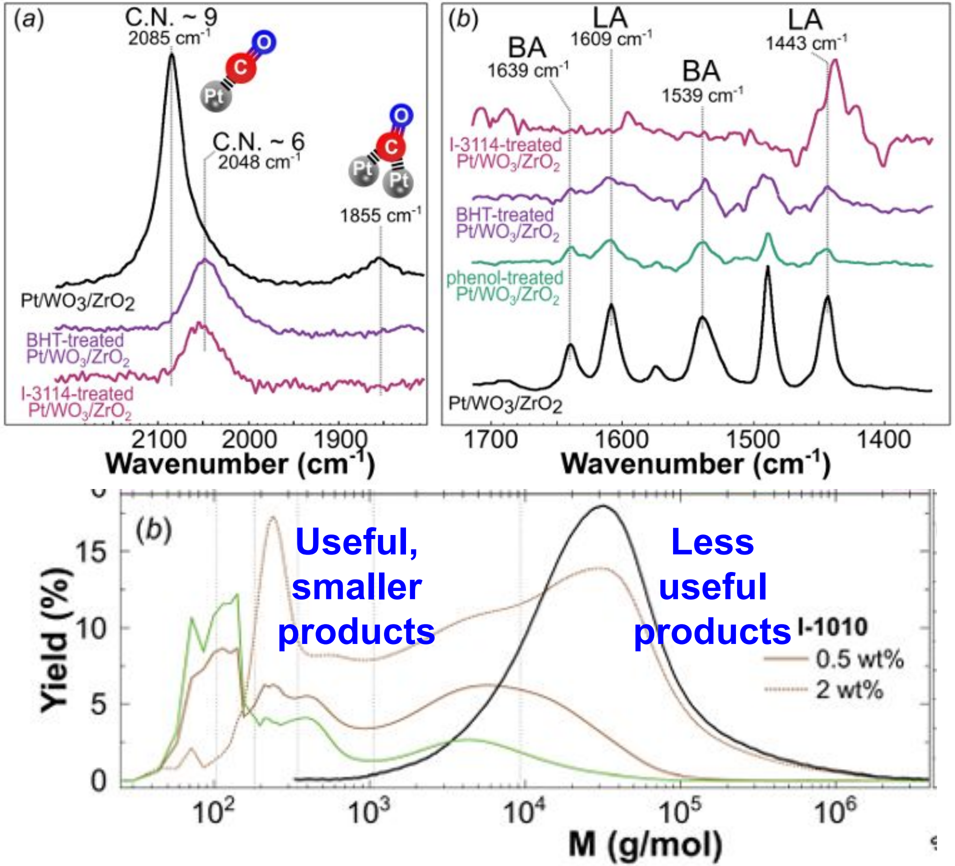
Green Chem., **2022**, 24, 7332-7339

Characterizing HDPE Hydrocracking Catalyst Poisoning by Antioxidant Additives

Pt deactivates from CO generated from additive decomposition

Stripping out additives improves catalyst activity *and* selectivity for lower molecular weight products

Takeaway: The phenol-like antioxidant additives in “real” HDPE are responsible for hydrocracking catalyst deactivation



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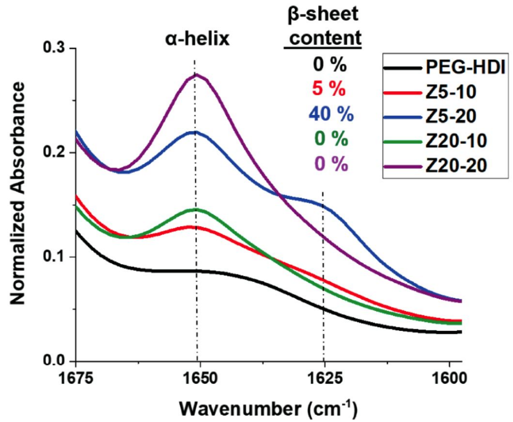
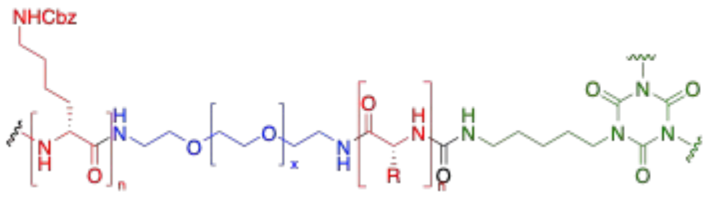
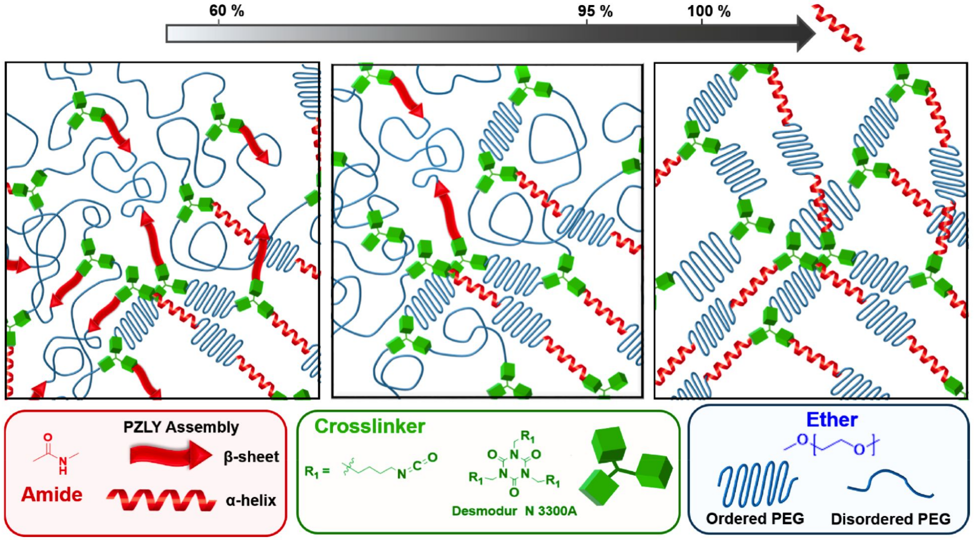
Nature-inspired Hybrid Polymers





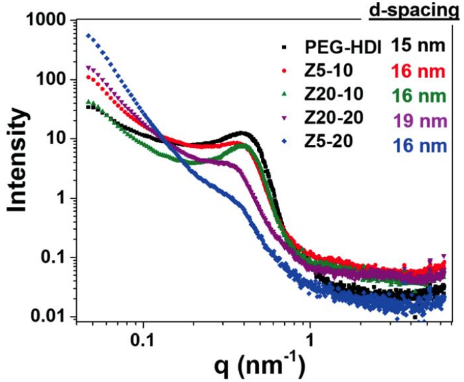


Nomenclature:
Zn-y, where y = peptide wt%
Z5: favors “intermolecular” β-sheet
Z20: favors “intramolecular” α-helix

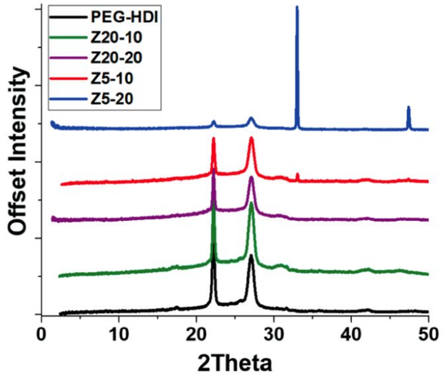
As helical and peptide content increases, we perturb and help order the PEG domains.
(Crystalline PEG is also helical)

Biomacromolecules, **2018**, *19*, 3445-3455

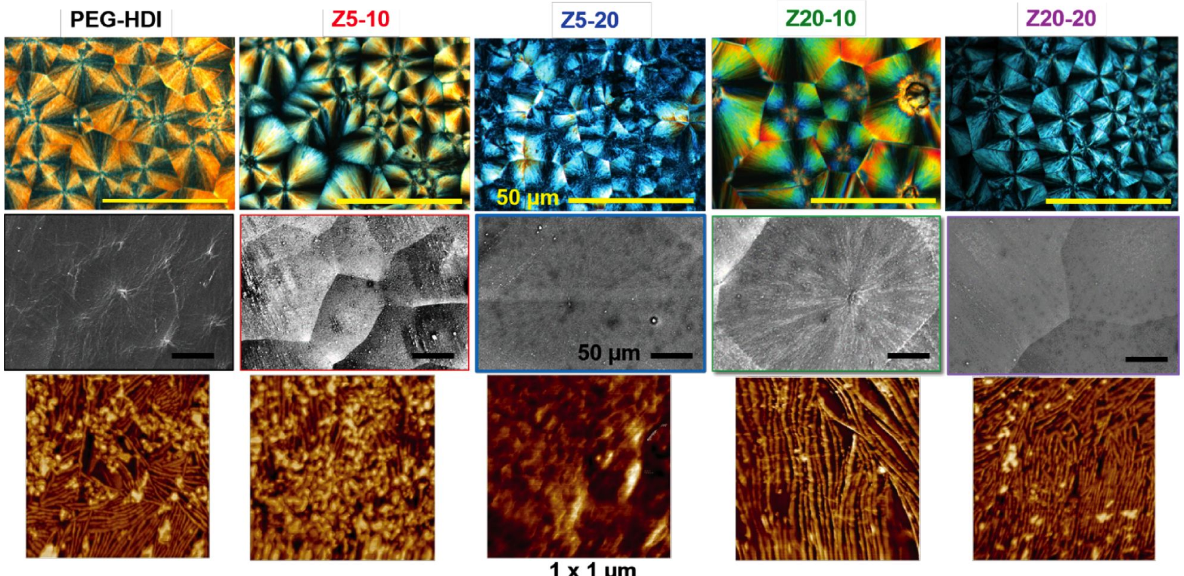
Nature-inspired Hybrid Polymers



SAXS shows phase separation, with broadening more prominent with higher peptide loading.



Greatest disruption to crystallinity with the β-sheet forming Z5-series.



Polarized OM shows “maltese cross” optical features of varying sizes.

SEM shows differing spherulite size perturbed by peptides, with the α-helix forming Z20 series forming larger spherulites.

AFM shows fibrous structure formed by crystalline PEG, most disrupted by Z5 series.