

Carbon is Carbon: Translating Lessons from Coal Chemistry to Biomass Valorization

Abstract for submission to ENFL Session honoring Eric Suuberg

Jillian L. Goldfarb (invited speaker)

James Adair, Paola Giammattei, San Lin Htun, Andrew Hubble, Madeline Karod, Nazih Kassem, Demola Ogunnaike, Matteo Pecchi, Zoe Pollard

Without substantial government subsidies, the integrated biorefineries producing sustainable aviation fuels, and the airlines industry's touts of carbon reduction, wouldn't be profitable. The thermochemical processes that convert waste to biofuels – pyrolysis, gasification, hydrothermal processing – are each uniquely suited to varying biomasses. Yet they all suffer from similar issues. First, the products are difficult to separate, and the biocrudes are unstable and require substantial downstream upgrading for use as a drop-in fuel. Second, the solid residues of these processes are of low value, though they could be upgraded to fuels and sustainable materials. Finally, capturing the fugitive carbon in the so-called process wastes could shift such carbon upcycling from economic liability to viability. We will demonstrate that it is possible to approach these three problems as simultaneous opportunities. While the thermochemical conversion pathways and separation techniques we design are for biomass conversions, they all leverage fundamental knowledge that pioneers in coal science – notably Prof. Eric Suuberg – developed over the past several decades. Together we may dare to say: petroleum paved the way for holistic carbonaceous waste valorization.