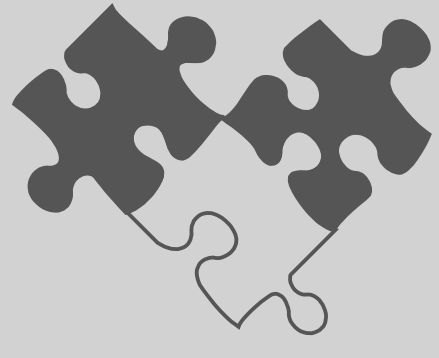
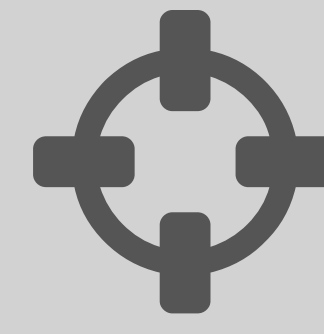
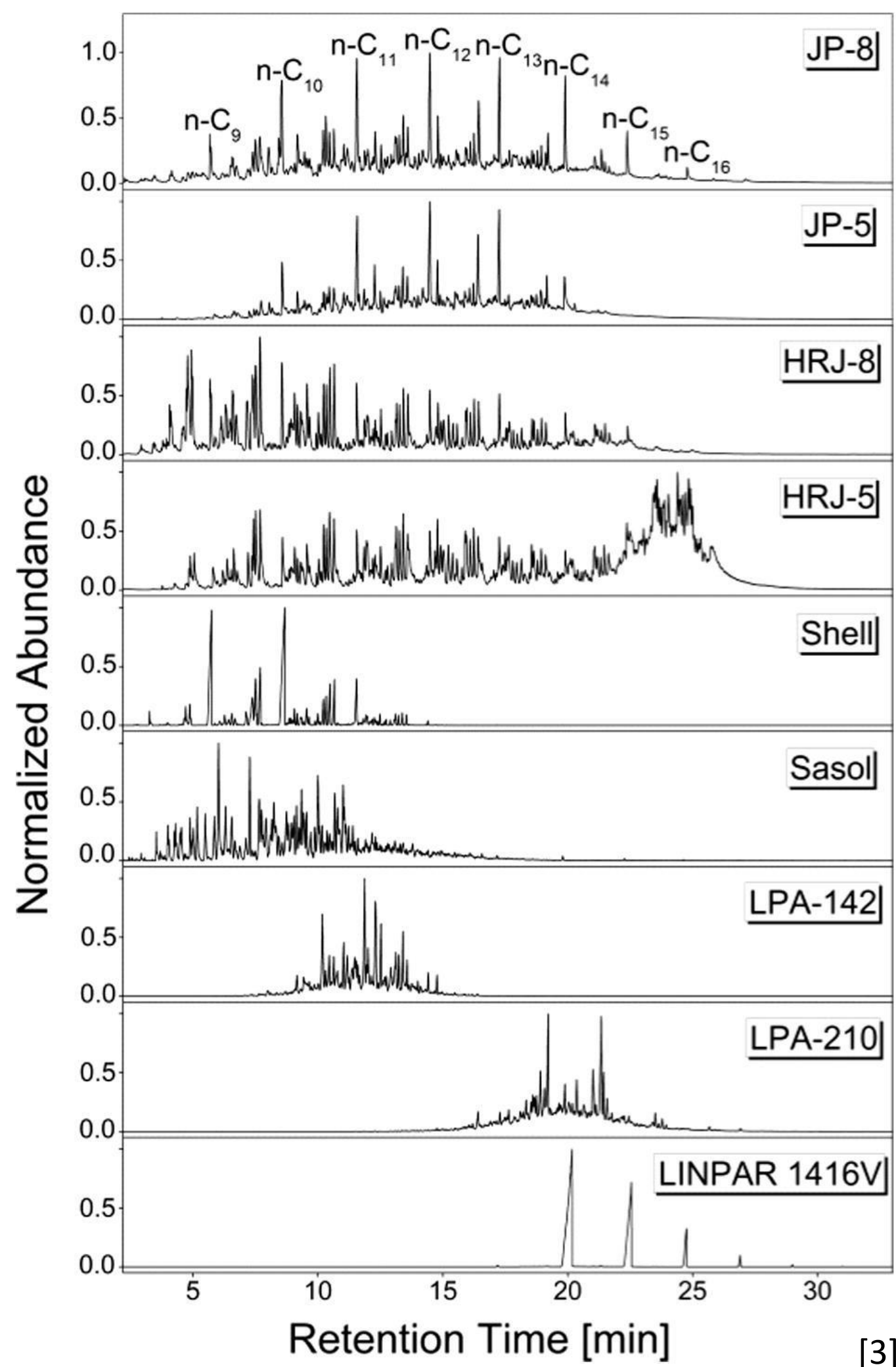


Propulsion and biofuels: Experimental Assessment and Modeling of Thermal Stability of Aviation Fuels and Bio-additives

BACKGROUND



- **ASTM D4054** = Standard practice for qualification and approval of new aviation turbine fuels and fuel additives = **Guidance regarding testing and property targets.**
- **Alternative jet fuels present large variation in composition.**
- **Tier 2 - Fit for purpose properties may be different for fuels derived from alternative sources.**



GOALS

ASTM D4054	Purpose	Amount of fuel required
Tier 1	Fuel Specification Properties	up to 38 liters
Tier 2	Fit-For Purpose (FFP) Properties	38 to 380 liters
Tier 3	Component Tests	950 to 38,000 liters
Tier 4	Engine Tests	up to 850,000 liters

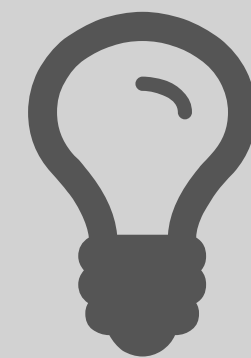
Goals:

- Fast screening of thermal stability of alternative fuels using small amounts of fuel and reproducing conditions during application.
- Development of surfaces and coatings and testing of their compatibility with fuel.
- Analysis of oxidation characteristics and correlation to composition.

References:

1. ASTM D4054-16, Standard Practice for Qualification and Approval of New Aviation Turbine Fuels and Fuel Additives, ASTM International, West Conshohocken, PA, 2016.
2. Valco, D. et al., Proc. Comb. Institute, 35(3) 2983-2991 (2015).

APPROACH



- **Thermal stability test:** Supply of **5 to 30 liters**, collection of fuel and solid residues, extended duration, with or without recirculation, circular and flat test sections to allow for testing of interaction with surfaces and coatings.

- **Oxidation test:** PSR/PFR facility - Supply of **g/h fuel and g/s N₂ + O₂**, 3.5 kW heater, temp. up to 1200 K, pres. up to 1.5 MPa, secondary air dilution, emissions by CG-MS, FID/TCD up to C25.

