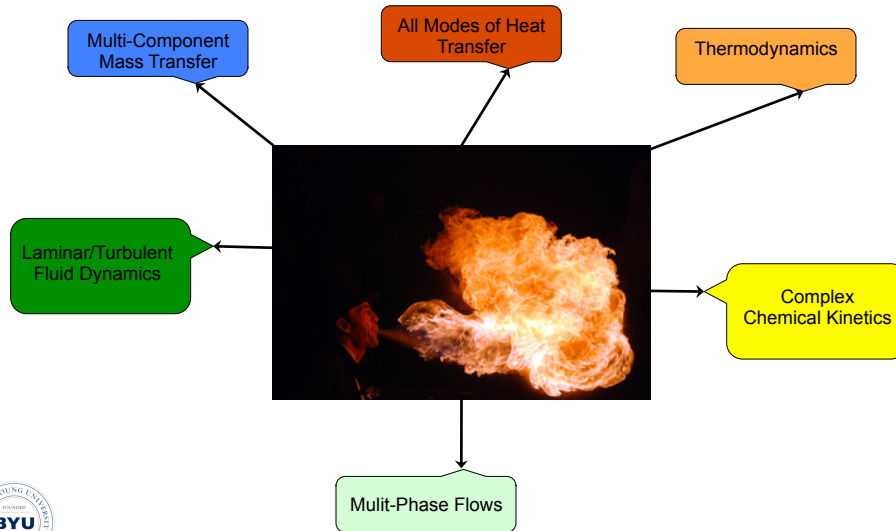


# Combustion Physics

3

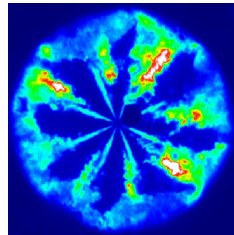


# Fuels

4

Mostly Hydrocarbons, all three Phases

- Gas (natural gas, light hydrocarbons)
- Liquid (diesel, gasoline)
- Solid (Coal, Biomass)



# Pollutants

5

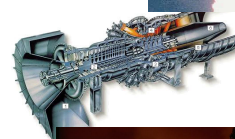
- NO<sub>x</sub>
- SO<sub>x</sub>
- P.M.
  - Soot
  - Ash
- Metals
- Unburnt HC's



# Applications

6

- Heating
  - Furnaces
  - Boilers
  - Stoves
  - Process Heat
- Power/Electric
  - Coal PP
  - Gas Turbines
- Military/Space
  - Rockets, Missiles
- Hazards
  - Fires
  - Explosions
  - Detonations
- Transportation
  - Turbines
  - Engines
- Other
  - Catalytic combustion
  - Metal combustion, particle synthesis



## What is combustion?

7

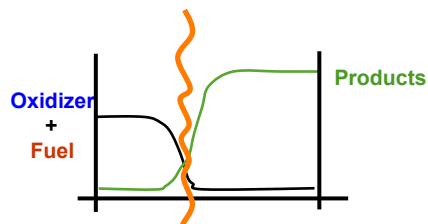
- What is combustion?
- How can we define it?
- What are its properties and characteristics?
- How do we know something is combustion and when it is not?



## Premixed and Nonpremixed Flames

8

Premixed



Nonpremixed

