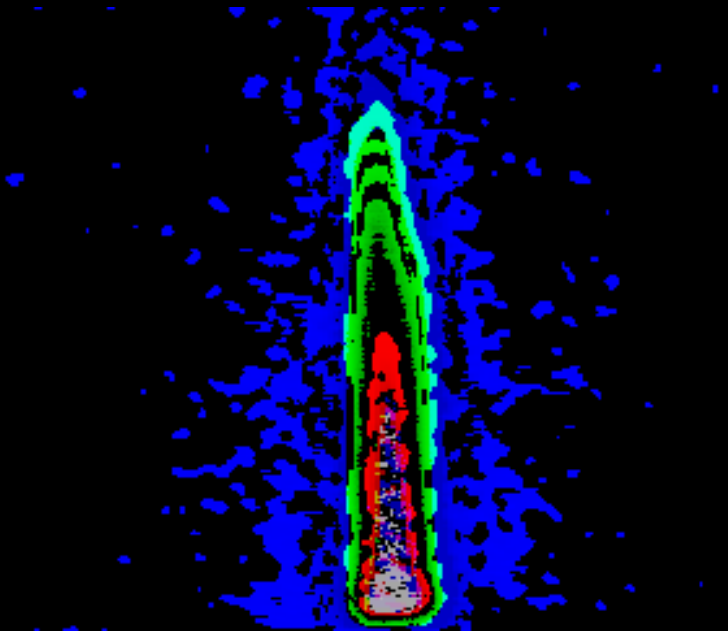


IFAS

Intelligent Flame Analysis System



Adelphi University

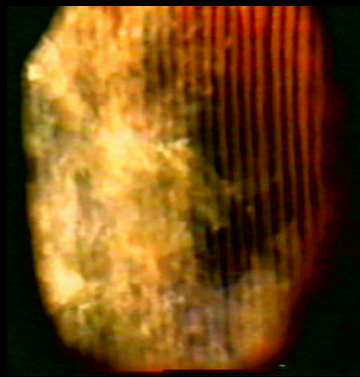
Garden City, NY

Dr. John Doohar

Principal Investigator

Program Objective:

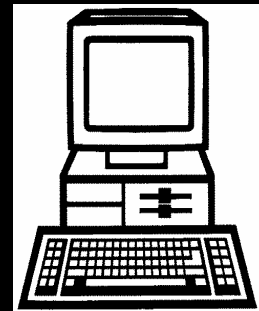
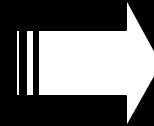
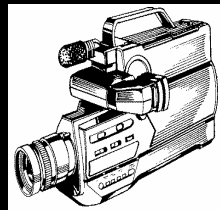
- Use a camera, filters, and computer to quantify the combustion process



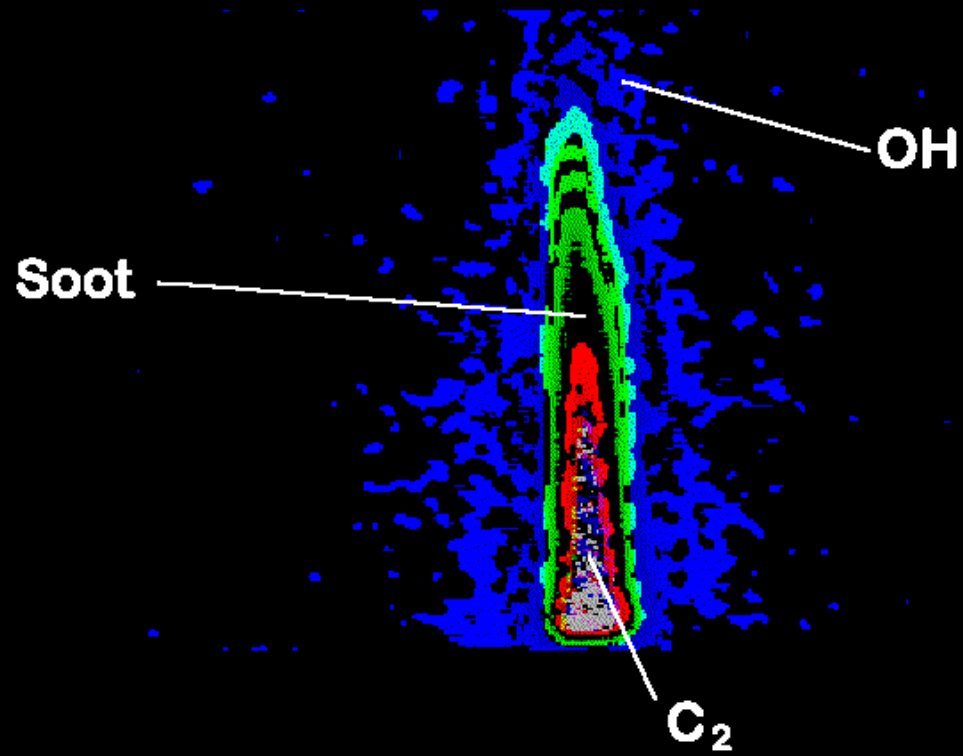
Glenwood Landing
Combustion Chamber



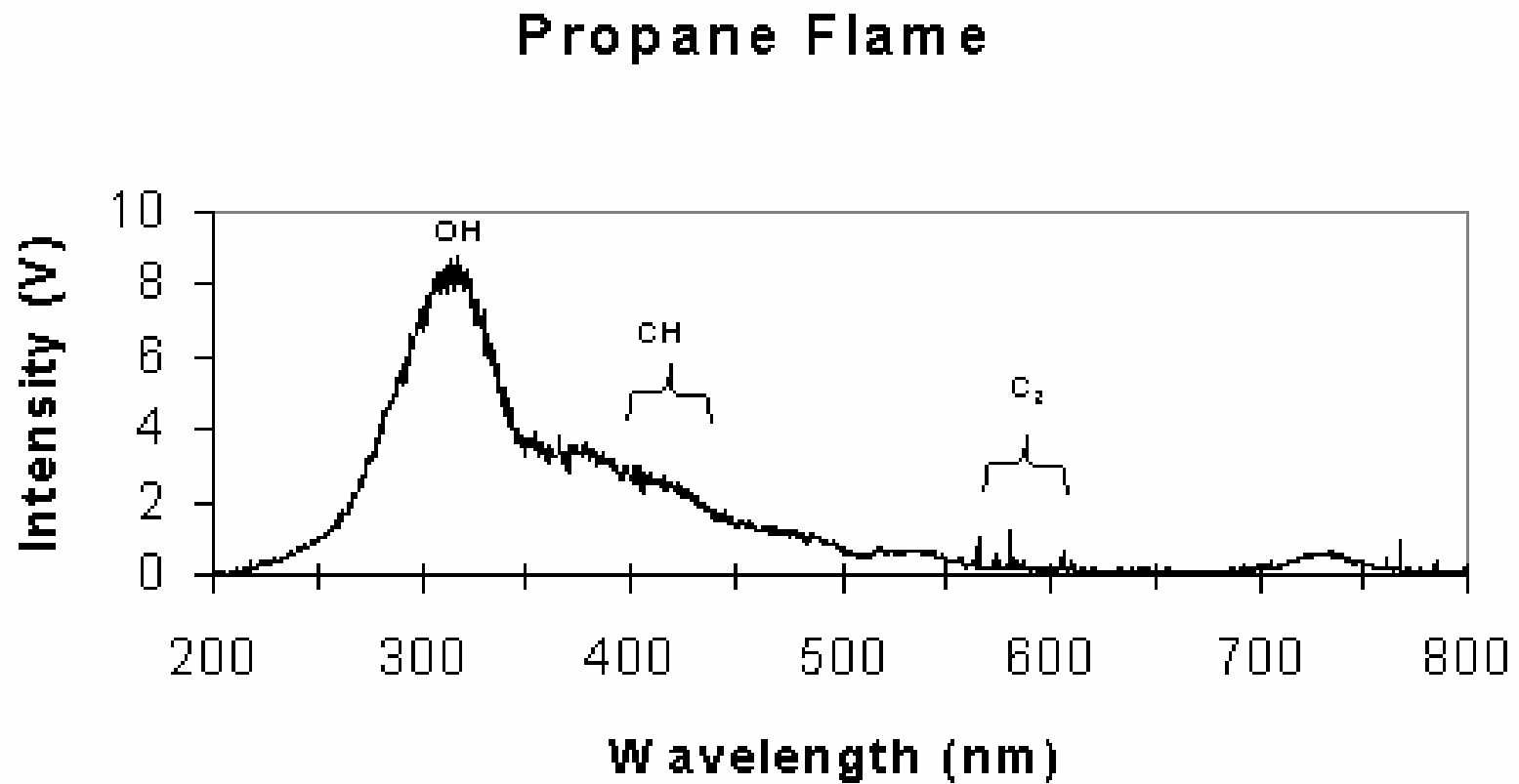
Filters



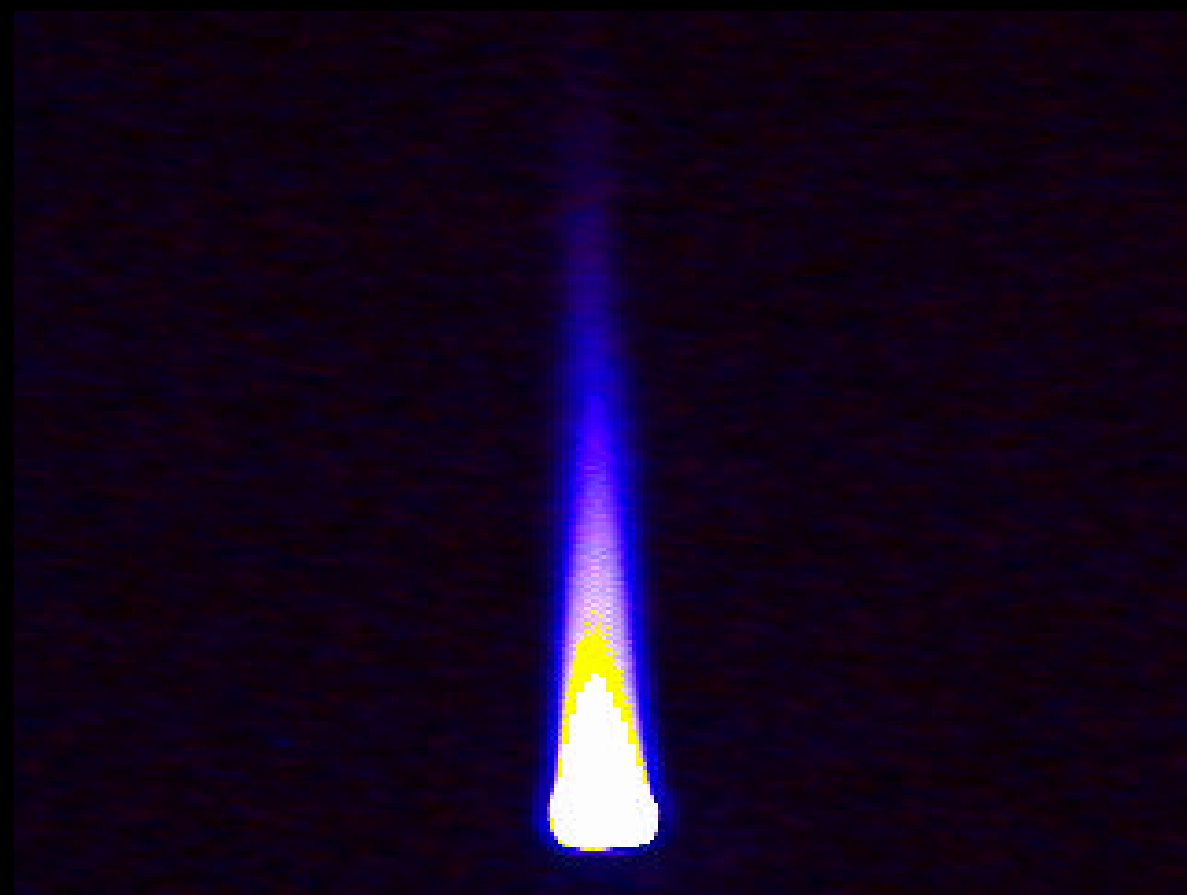
Flame Structure



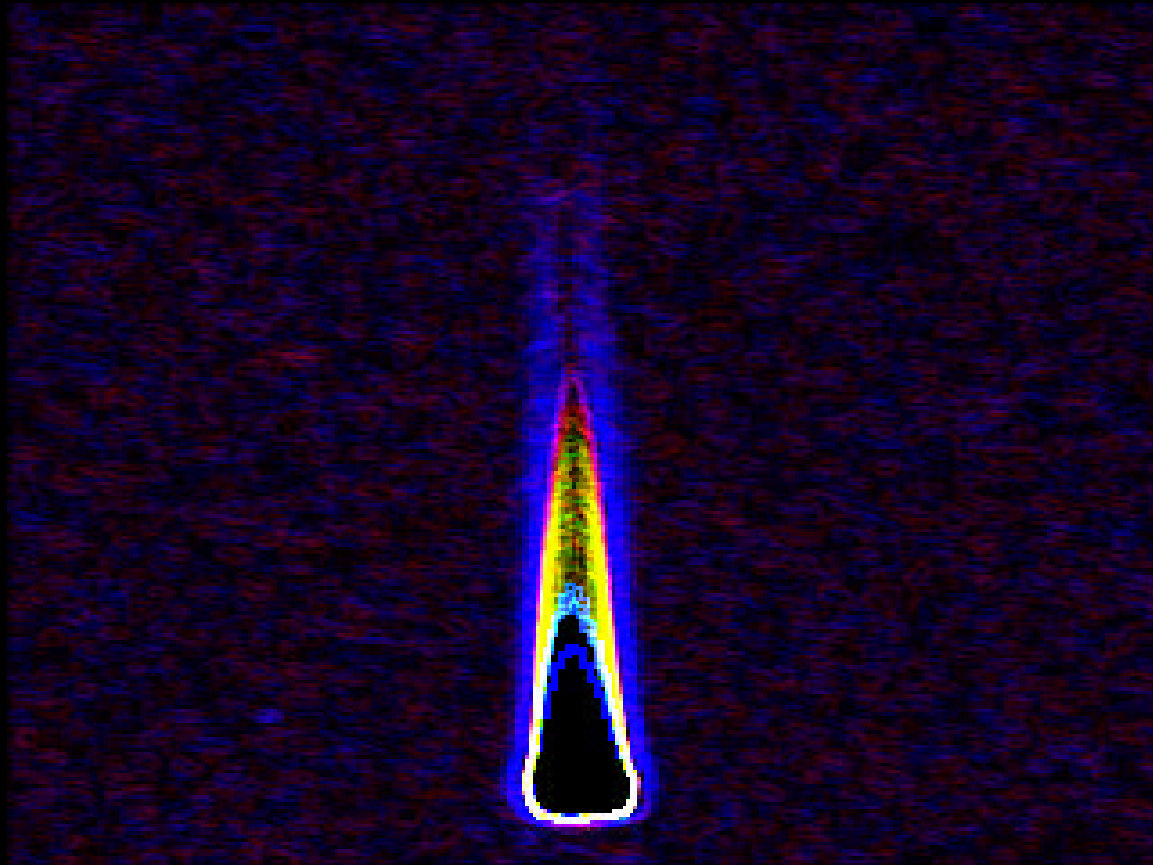
Flame Spectra



Propane Flame



Edge Detection Analysis Propane Flame



Wide Band Spectral Imaging Propane Flame

Blue Filter

Green Filter

Red Filter

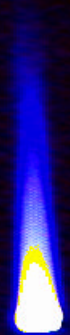
400-440 nm Filter

(OH)

(C₂)

(Particulates)

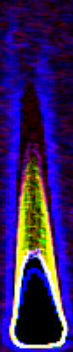
(CH)



Spectral Edge Detection Analysis Propane Flame

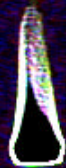
Blue Filter

(OH)



Green Filter

(C₂)



Red Filter

(Particulates)

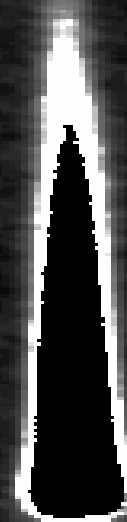
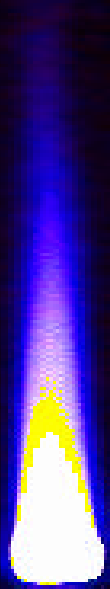


400-440 nm Filter

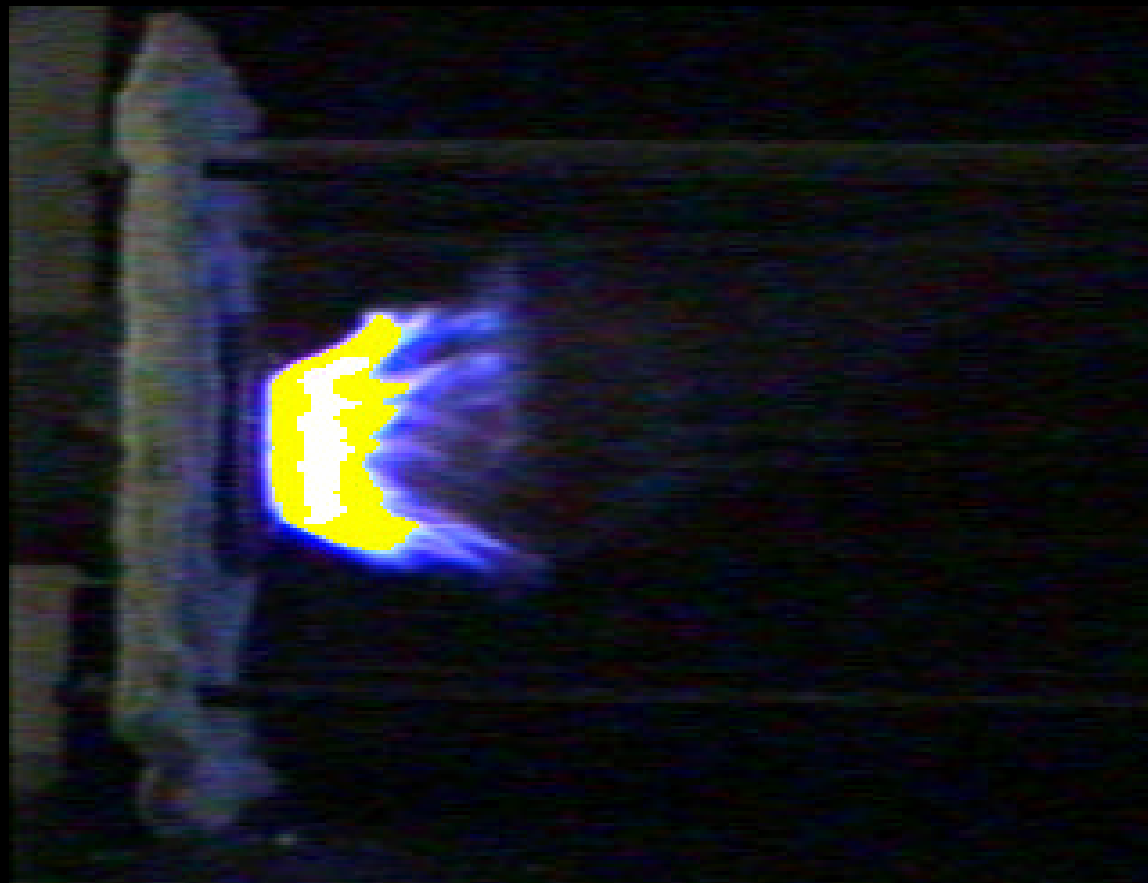
(CH)



Analysis of Fringe Pixels provides quantitative information



Adelphi Combustion Chamber



Wide Band Spectral Imaging

Adelphi Combustion Chamber

Blue Filter

(OH)

Green Filter

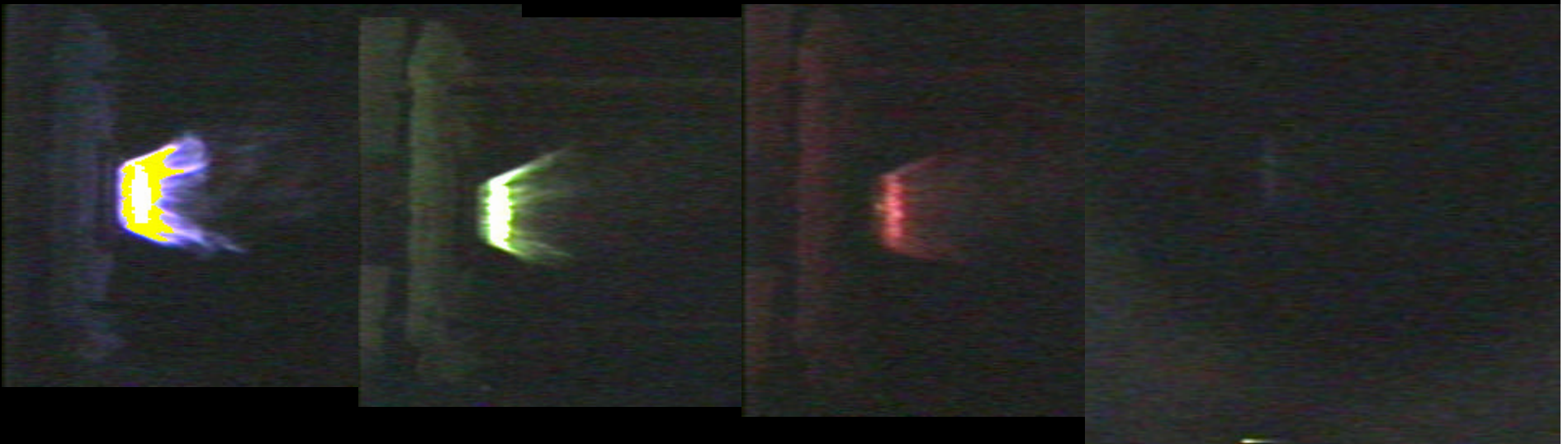
(C₂)

Red Filter

(Particulates)

400-440 nm Filter

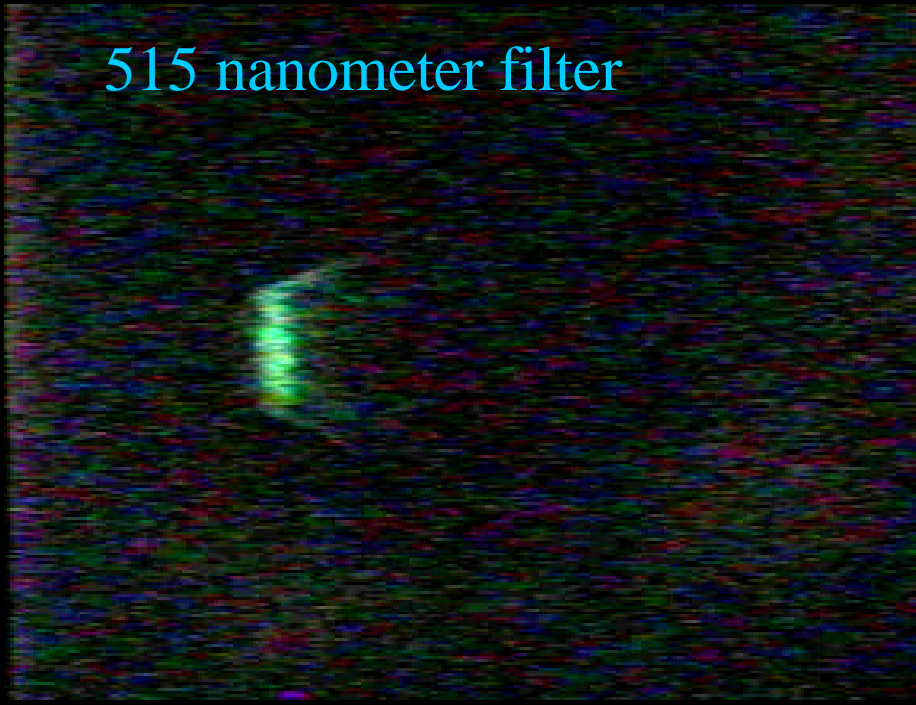
(CH)



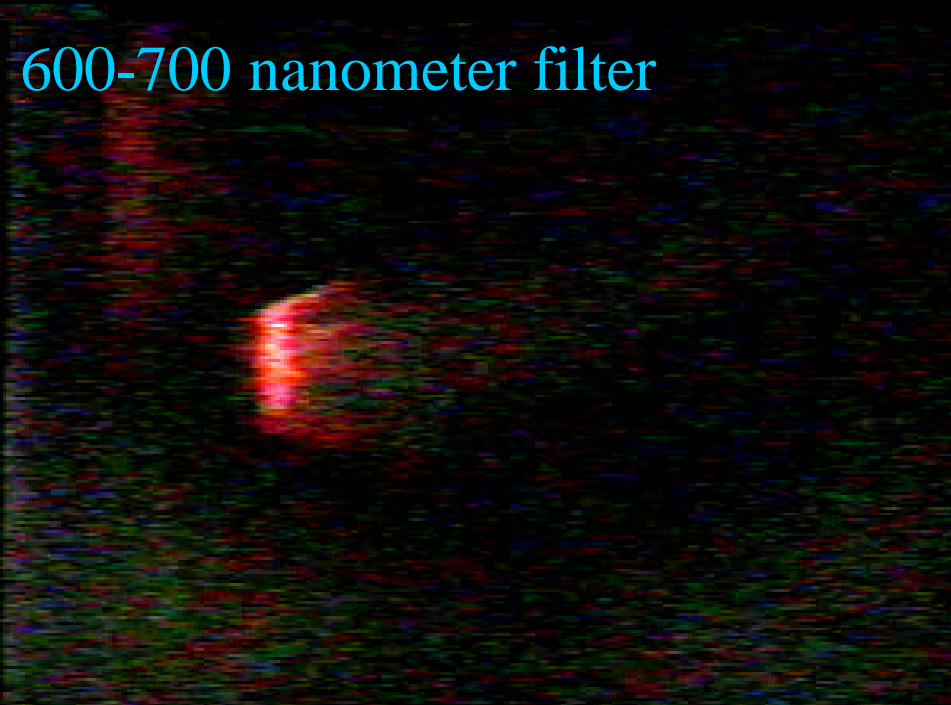
Narrow Bandpass Spectral Imaging

Adelphi Combustion Chamber

515 nanometer filter



600-700 nanometer filter

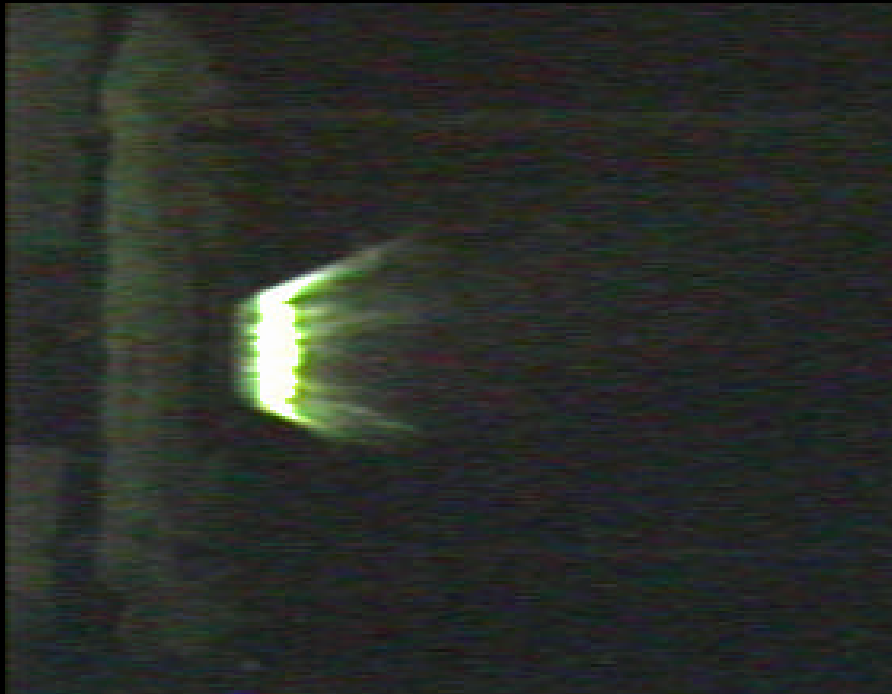


Fringe Pixel Analysis

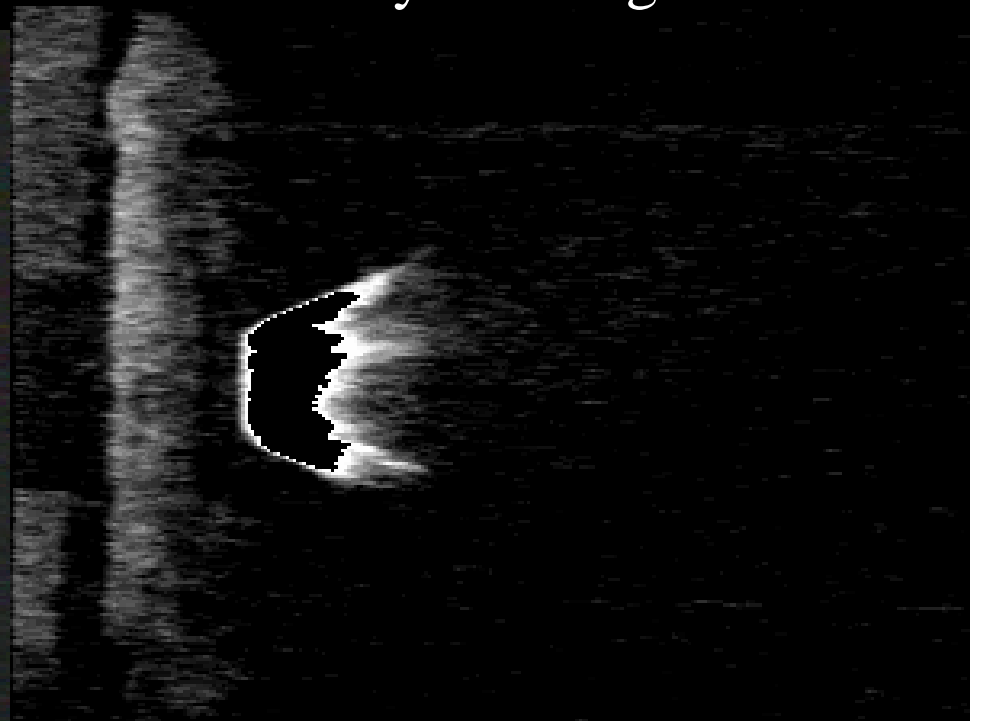
Adelphi Combustion Chamber

Green Filter (C_2)

Original Image

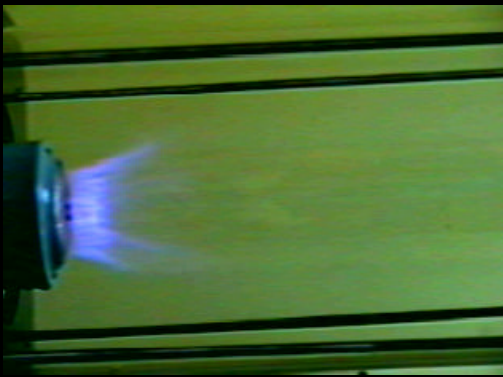


Analyzed Image

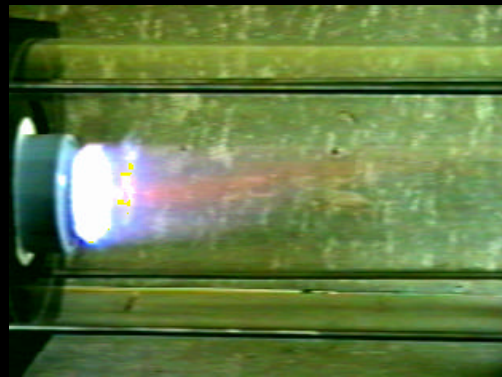


Effect of Oxygen Variation Adelphi Combustion Chamber

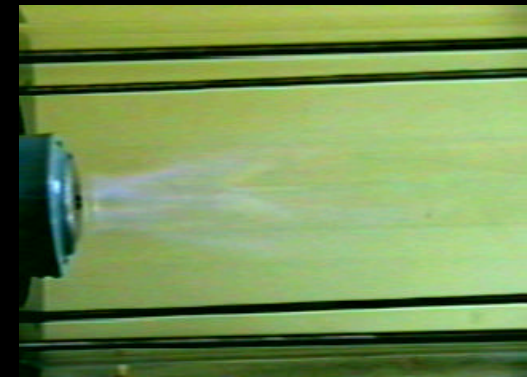
Oxygen Starved



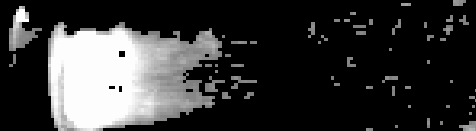
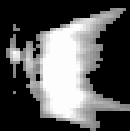
Oxygen Normal



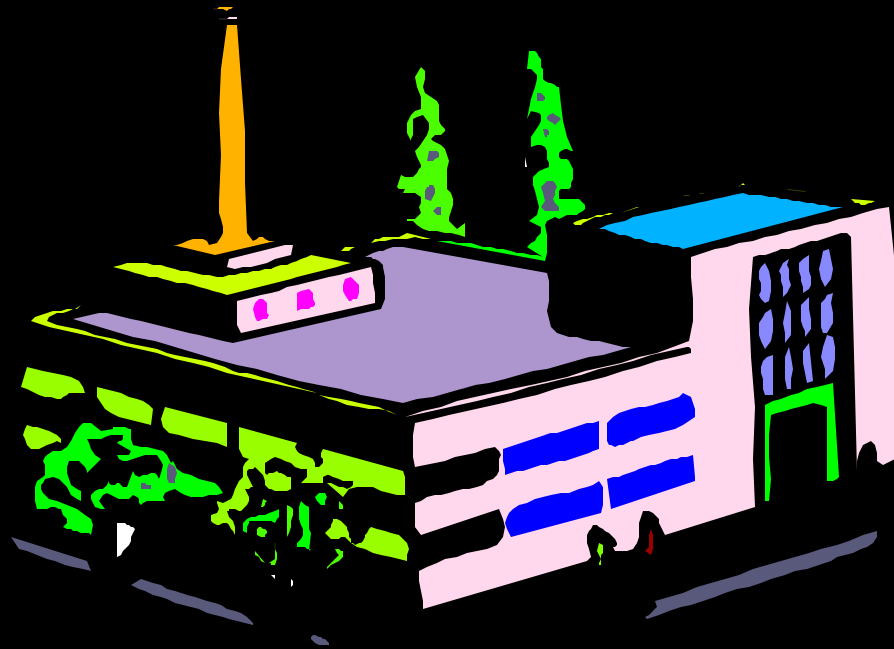
Oxygen Rich



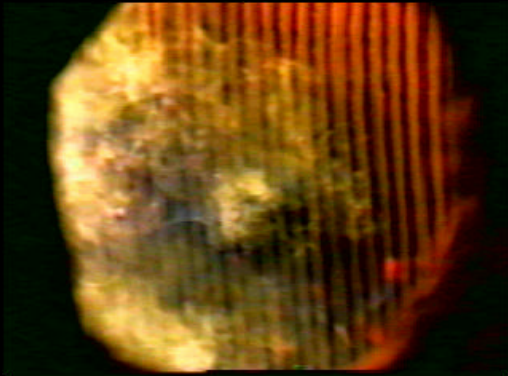
Analyzed Images:



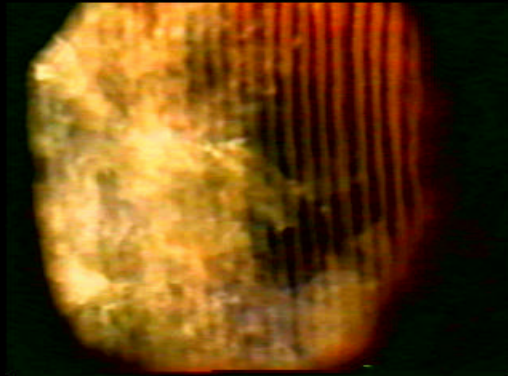
Glenwood Landing Power Station



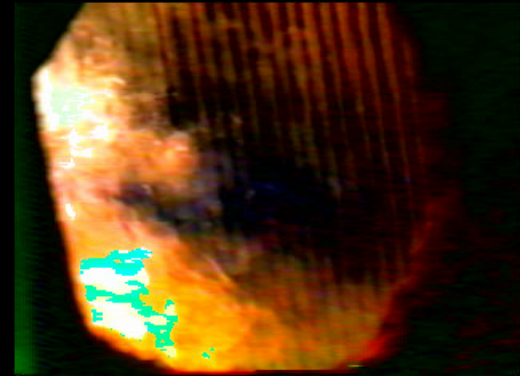
Combustion in the Glenwood Landing Furnace



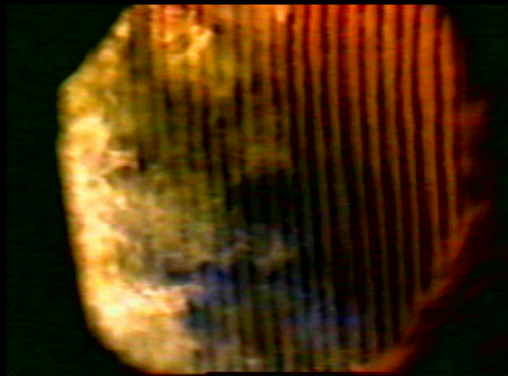
Capture



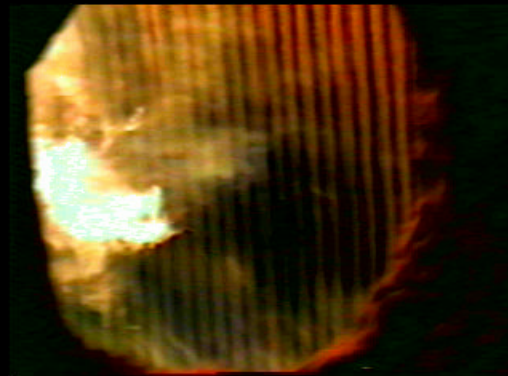
Capture



Capture



Capture



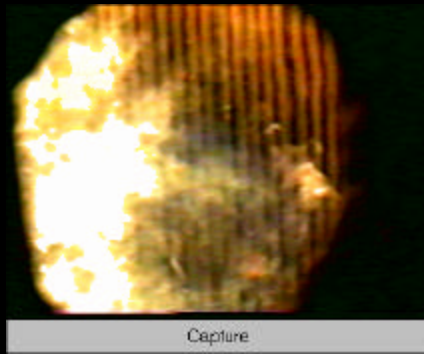
Capture



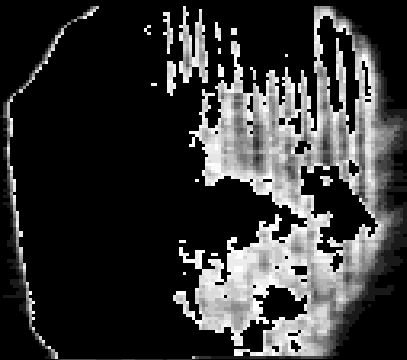
Capture

Fringe Pixel Analysis

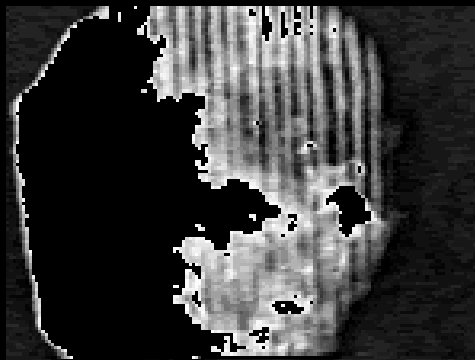
Glenwood Landing Combustion Chamber



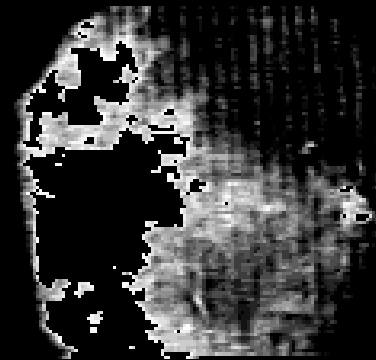
Red



Green



Blue



The IFAS software will work as follows:

- Image capture software captures a single frame to the windows clipboard

