Pollution Removal from Diesel Engines

Networking Meeting
Mechanical Engineering

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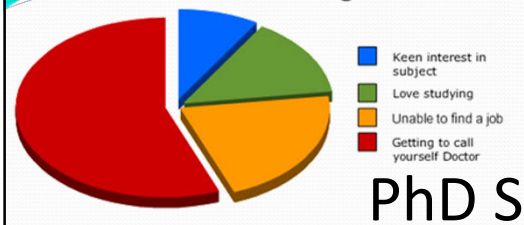
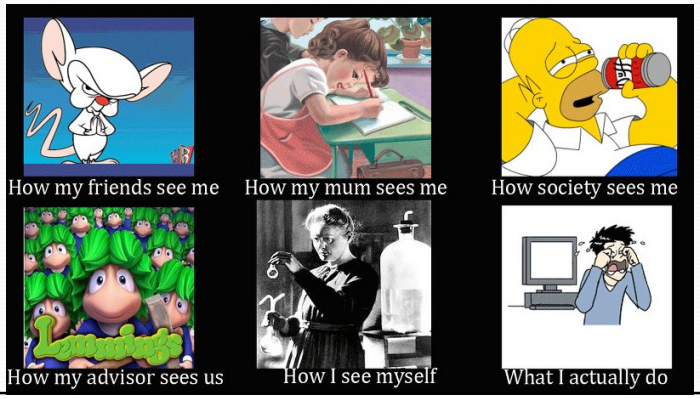
PhD Motivation

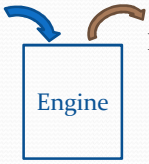


PhD Student



Why do car engines pollute ?

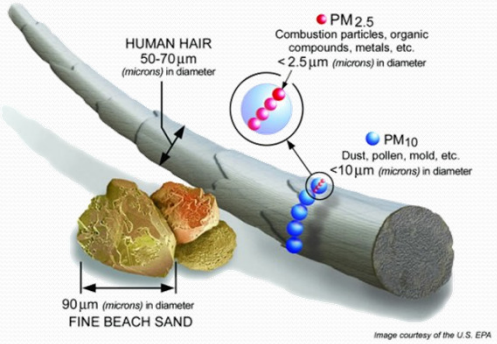
Air + fuel (diesel)



Exhaust gas

Chemical reactions in engine produce exhaust pollutants (solid and gaseous)

Solid particles size ~ 0.1 µm
(hair cut in 600 in the length)

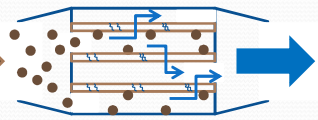


Solutions to reduce vehicle pollution

Use of **after-treatment components** in the exhaust system of the car

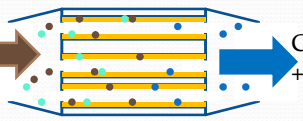
Diesel Particulate Filter (DPF)

Exhaust gas with particles



Diesel Oxidation Catalyst (DOC)

Exhaust gas + oxygen



CO_2 + water

$CO + \frac{1}{2} O_2 \rightarrow CO_2$

$HC + O_2 \rightarrow CO_2 + H_2O$

Objectives

After-treatment effective at temperature > 200°C

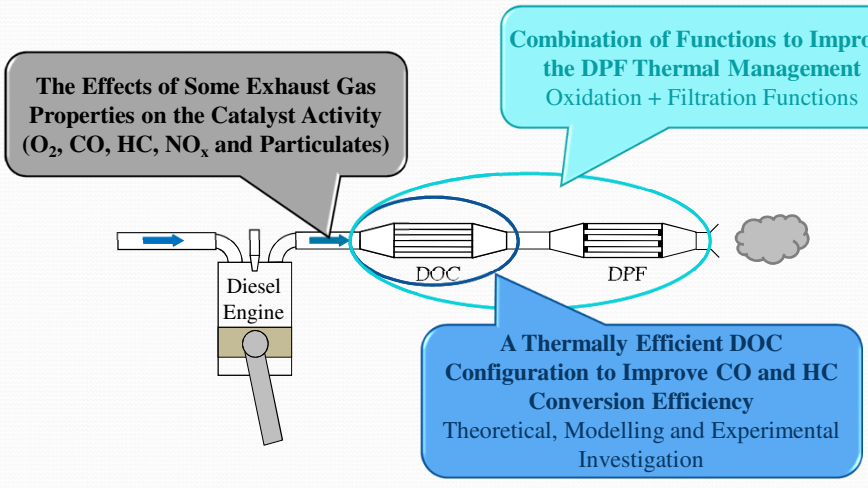
Engine started in the morning: cold + high emissions

Emission legislation

Necessity to improve low temperature activity to reduce the pollution

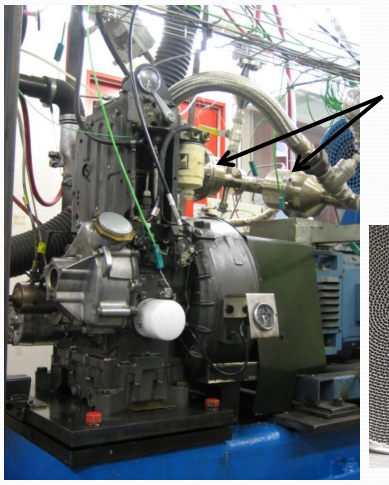
Strategies

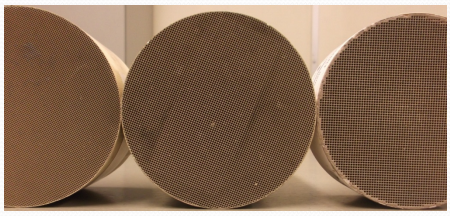
Two perspectives studied: catalyst design & exhaust gas composition

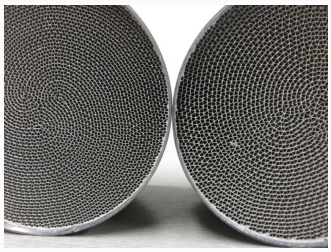


Objectives

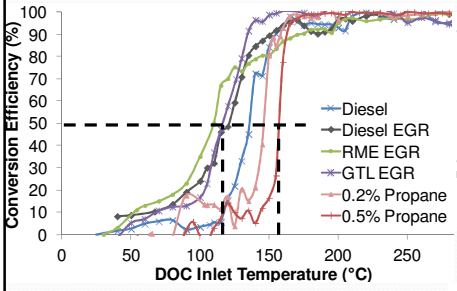
Combination of simulation and experimental studies





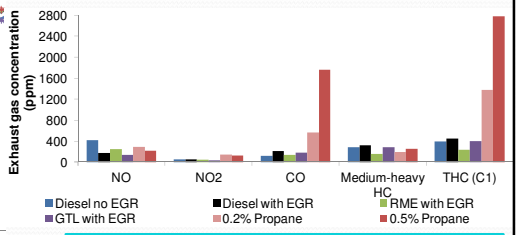


Results from Exhaust Gas

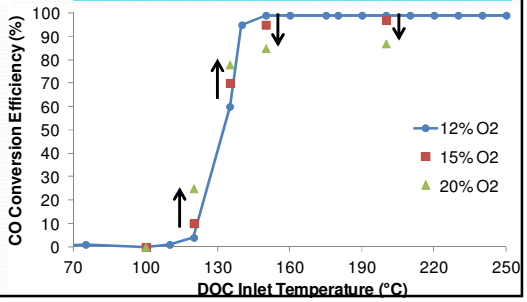


Effect of Exhaust Gas Composition

$CO + \frac{1}{2} O_2 \rightarrow CO_2$



Effect of Oxygen Exhaust Concentration

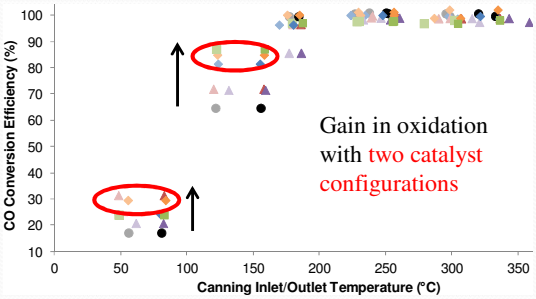


Results from Catalyst Design

Catalyst Thermal Behaviour

Changes in the catalyst cell dimensions to promote warming up and oxidation efficiency

$$CO + \tfrac{1}{2} O_2 \longrightarrow CO_2$$



Gain in oxidation with two catalyst configurations

Thank you for Your Kind Attention
Any Question ?