

# Reforming of diesel for hydrogen production

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#### Outline



- The transport sector today
- How hydrogen can be used on a HD vehicle
- How is hydrogen produced on demand for mobile applications?
- Evaluation of catalytic materials
- What is planned for the near future?





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# Why the transport sector is such a problem...



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#### **Regulations & laws**

Idling legislations in many states in the USA



www.volvotrucks.com







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# Where does H<sub>2</sub> come into play?







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#### What is reforming?







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#### 3 different strategies

 $H_2$  $C_xH_y$  $H_2O$ fuel  $CO_{2}$ reformer  $O_2$ CO  $H_2O$ exothermic endothermic Partial Steam coke precursors high H<sub>2</sub> yield oxidation reforming fast reaction slow reaction autothermal Autothermal high H<sub>2</sub> yield reforming  $O_2/H_2O$  ratio





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#### Autothermal reforming





- Thermally stable material
- High H<sub>2</sub> yield/selectivity
- Low formation of coke precursors
- Long life time
- Cycling (start-up/shut down)





### Evaluation of catalytic materials

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# Characterization of the materials

- Available instruments at Chemical Technology
  - X-ray diffraction
  - TPR/TPO
  - Chemisorption
  - BET surface area measurements
- Characterization done in cooperation with external actors
  - TEM with EDS
  - SEM
  - X-ray diffraction of very small sample amount





#### Future plans

• Test of a new reactor design

- Multiple air inlets in axial direction
- Micro reactor
- Cooperation with Karlsruhe Institute of Technology (KIT), Germany
- Tailoring catalyst for reforming
  - Zone-coating
  - Altering the mass transport

