The Advanced Combustion and Emission Control (ACEC) Technical Team

Low Temperature Aftertreatment (LTAT) working group

Including representatives from:

- FCA, Ford, GM, ORNL, PNNL, & DOE

Why

- ➤ Harmonize aftertreatment direction with emerging combustion strategies
- Assist DOE and USDRIVE in evaluation & management of projects
- A pathway for *comparative* evaluation and benchmarking
- Accelerate pace of catalyst innovation by maximizing value and impact of reported data

AFTERTREATMENT PROTOCOLS FOR CATALYST CHARACTERIZATION AND PERFORMANCE EVALUATION

Consistent and realistic standardized catalyst test procedures that sufficiently capture a catalyst technology's performance capability

- ☐ Solely intended as guidelines for sharing results of research with the technical community
- ☐ Meant to be broadly shared in public forum to evaluate and benchmark performance
- ☐ NOT meant to replace or dictate individual research institute protocols



Aspirations

- General community consensus
- Consistent with anticipated technologies
- Reproducible, adaptable in various labs
- Be practical and have utility
- Literature citations

Protocol Considerations

Performance Modeling

RESEARCH ACTIVITY THE PROTOCOL IS SUPPORTING

- Discovery stage: screening for overall performance, global in nature
- Elementary step-based modeling: isolating each reaction/ads./des. step
- Typically governed by relative maturity of technology
- Will dictate complexity of the test methodologies employed

Conversion Passive Adsorption

TYPE OF FUNCTIONALITY BEING STUDIED

- Conversion: Rate (single reaction or class of reactions) versus temperature
- Adsorption: Rate (ads/des) PLUS capacity PLUS desorption temperature
- Adsorption characterization (procedures and equipment) more complex

Functionality Device

COMPLEXITY OF THE AFTERTREATMENT PROCESS

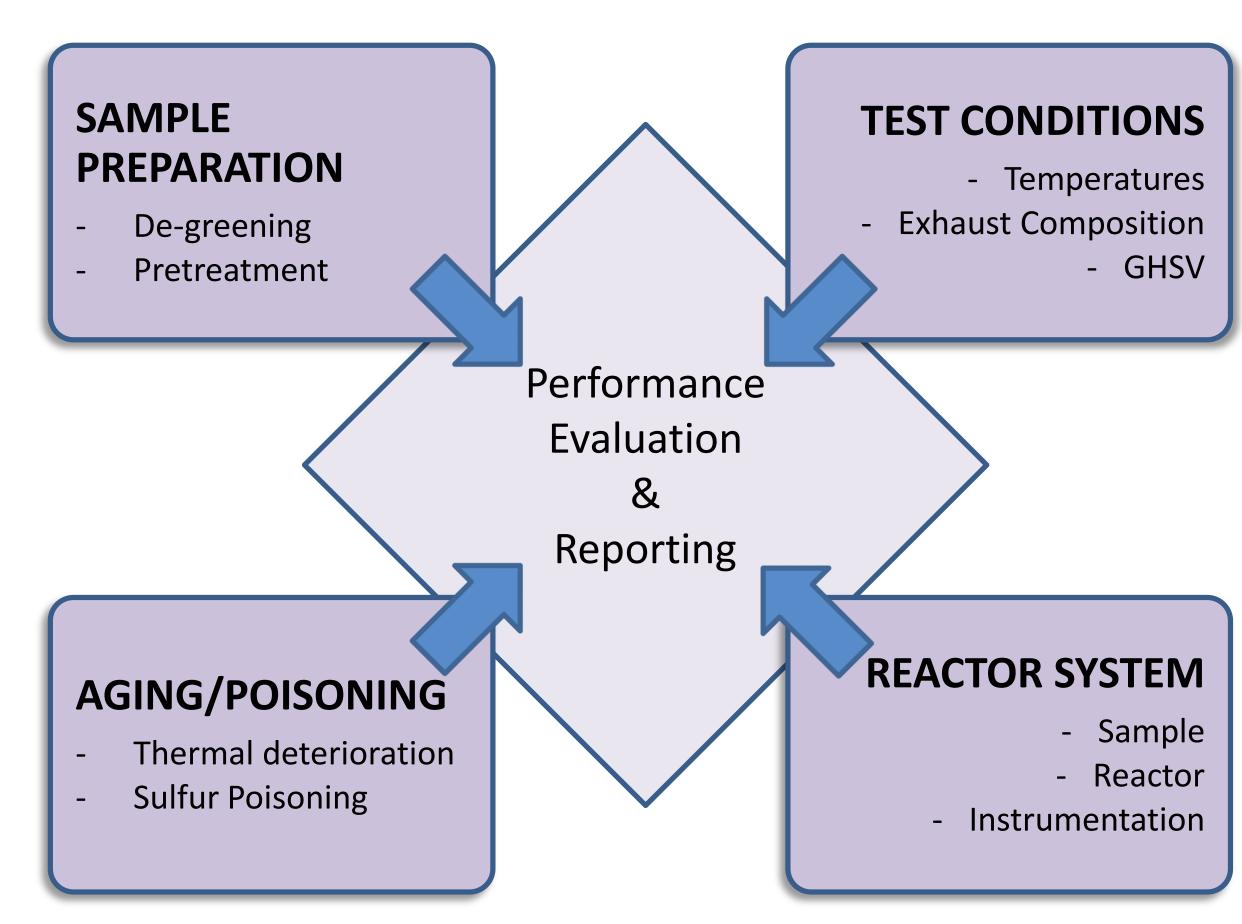
- Singular functionality: conversion- or adsorption-based
- Device (e.g., system): often involves multiple functionalities (e.g., NSR)
- Dictates complexity of steps required for adequate characterization

Combustion Platform

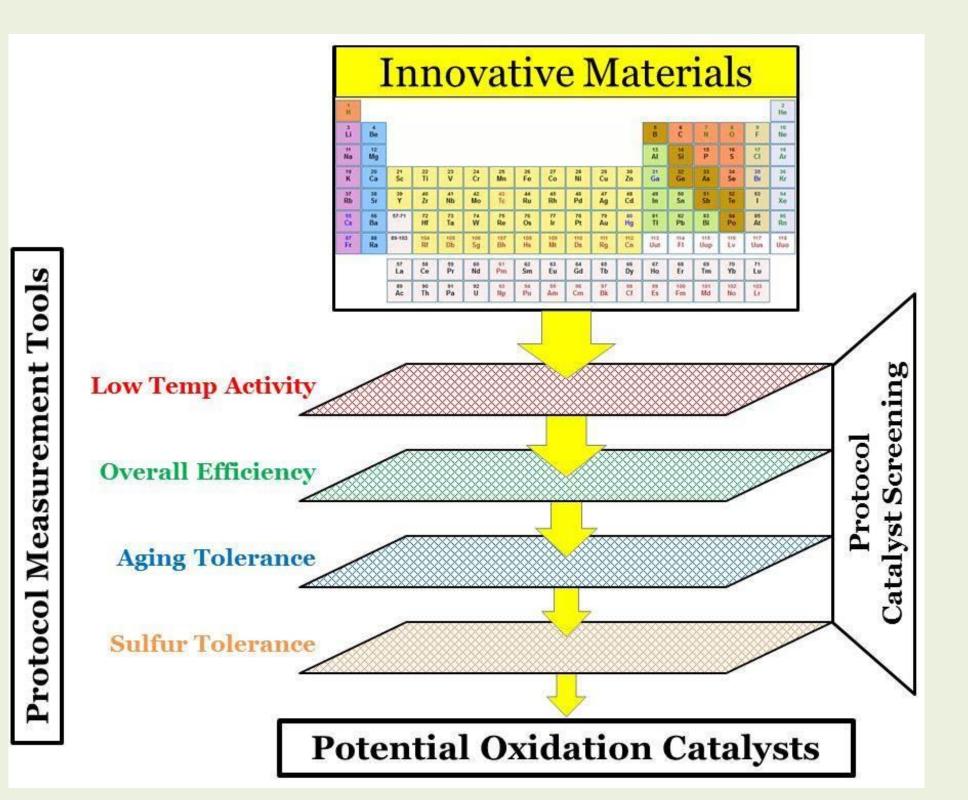
ENGINE TYPE AND COMBUSTION STRATEGY

- Diesel versus Gasoline
- Stoichiometric versus Lean combustion
- Conventional versus "Advanced" low-temperature combustion (e.g., RCCI)

Protocol Structure



STEP 1 – Low-Temperature Oxidation



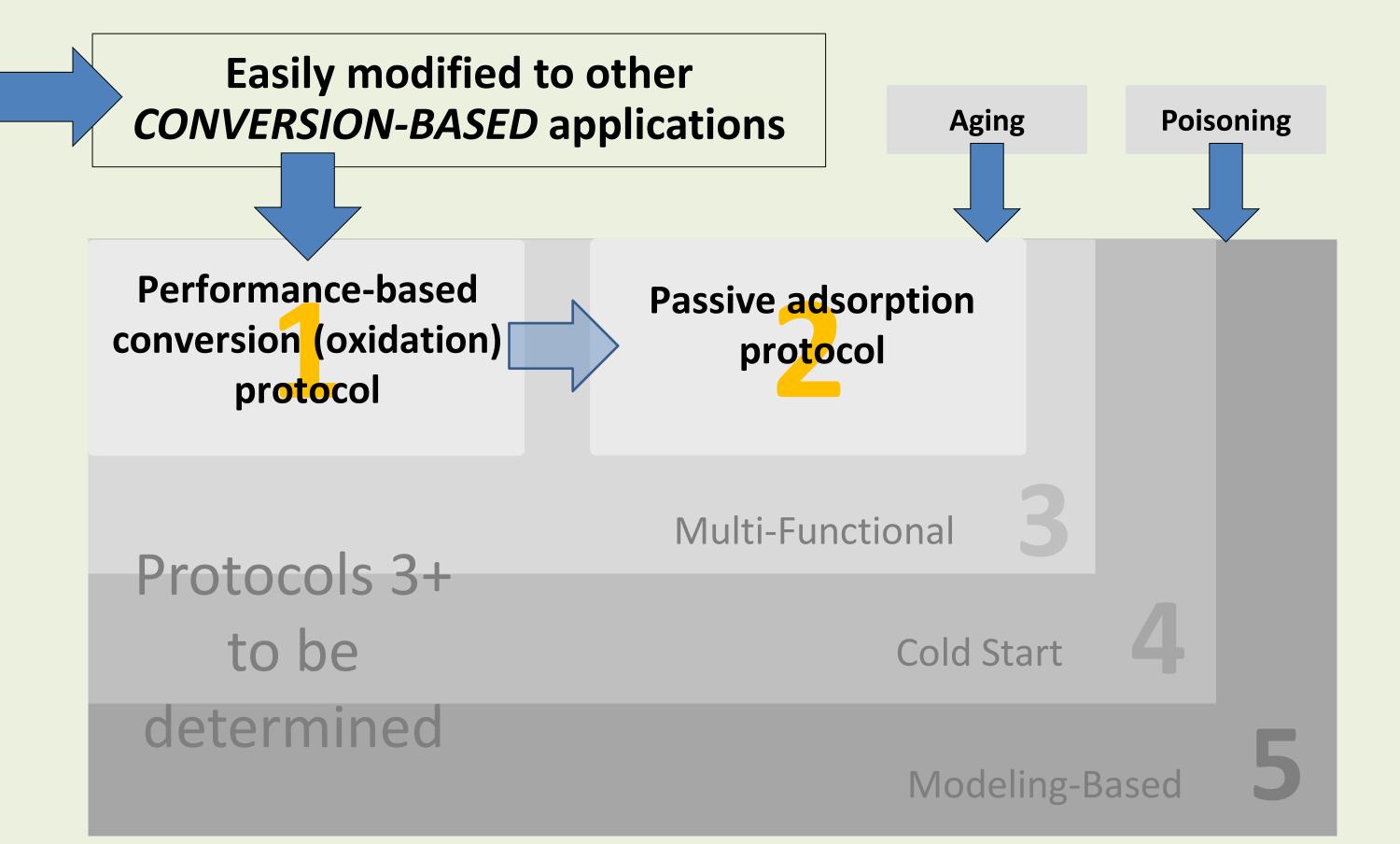
Performance

Conversion

Functionality

AND

Device



> Additional protocols will be generated as needed based on technology area