

Development of a new CNG technology for stoichiometric heavy duty applications

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Compressed Natural Gas (CNG) market is expected to grow further in the future, especially in Europe and China. CNG vehicles are the alternative to Internal Combustion Engine Vehicles. The use of CNG is good for the environment because of its reduced emissions. CNG is one of the cleanest burning fuels available. The use of CNG reduces carbon monoxide emissions 90 to 97 percent.

Umicore will improve market position by key projects with China OEM in 2021. Future market share (2025+) is highly depend on whether we succeed in bring new/optimized catalyst and if new legislation kicks in.

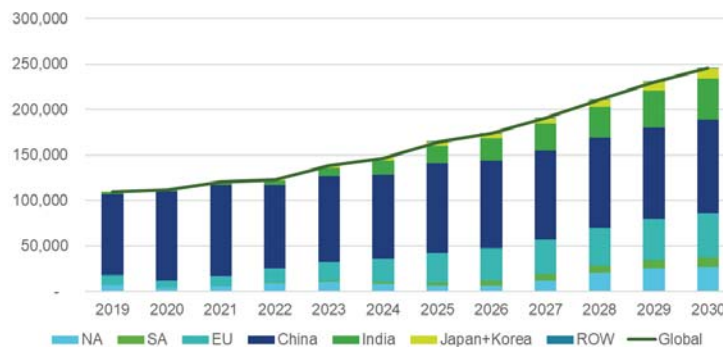


Figure 1. Global CNG market - Regions

The current best technology is MLKX6 and this has been the case since the early 2000s. A number of efforts have been made to arrive at improved designs over the MLKX6 by direct application of TWC state-of-the-art catalysts to CNG but this has not been successful. A detailed review of the recent literature indicates that stoichiometric CNG catalysis is quite unique mechanistically as compared to TWC and requires a fundamentally different type of design. This will be reviewed and a brief summary of designs will be discussed that may be superior to the MLKX6. However, testing is still at an early stage.

Base on our current test results, introduction of new Aluminas to the Palladium/Rhodium Layers give improved performance. Further optimization of the Alumina/OSC ratio in the Palladium Layer also gives improved performance with the new Aluminas.

Samples	Layer 1 (Pd)			Layer 2 (Rh)		
	Alumina Type	Al/OSC ratio	OSC Type	Alumina Type	Al/OSC ratio	OSC Type
MLK-X6	Old Gammas	X	A	Old Gammas	X'	A
R&D samples	New Gammas	X	A	All HP Gammas	X'	A
	New Gammas 2	Y	B	New HP	Y'	B
	New Gammas 3	Z			Z'	C
	New Delta				W'	D

Figure 2. Recipe Table

The R&D samples tested at Synthesis Gas Bench. It shows particularly effective CH₄ reduction and secondary emission.

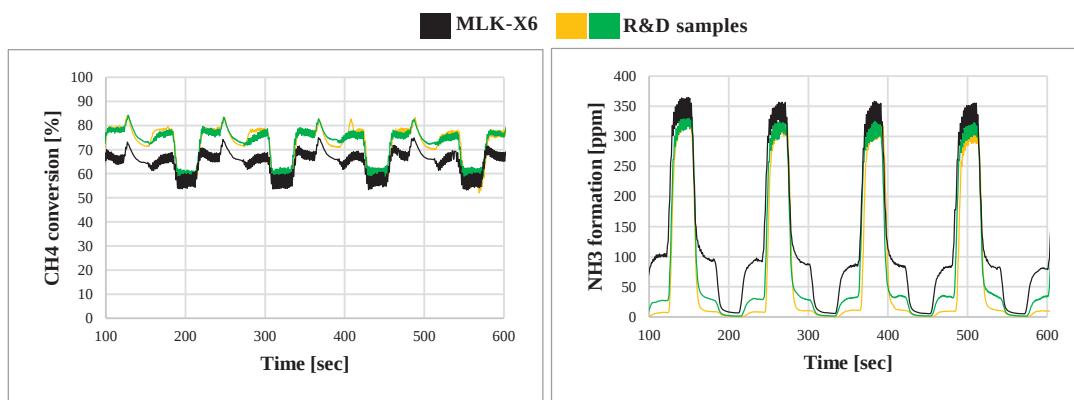


Figure 3. SGB test result