CP 2

CONCEPT PAPER

for KIER International Cooperation project

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Title	Novel nitride/carbide nano-structured support materials for M@Pt active metals of fuel cell applications			
Description	● Barriers to tackle The main challenges in electrocatalyst research for fuel cells are cost and durability. On the active metal side, it is important to reduce the absolute use of platinum group metals (PGM) and with regard to the support materials a high-voltage durability is important.. - Catalysts' Activity : ≥ 0.44 A/$mg_{_PGM}$ - Catalysts' Durability : < 40% loss in activity under potential cycling - Catalysts' Cost : ≤ 0.125 $mg_{_PGM}/cm^2$ ● Strategy to solve <u>Employing nitride/carbide substrates to improve the stability of M@Pt core-shell active metals</u> - Refractory-metal-based & transition-metal-based nitrides as corrosion-resistant substrates - Candidates (NbN, TiN, VN, TaN, WN, ZrN, CrN, NiN, CoN, FeN, MnN, etc.) - Carburizing of the above mentioned candidates - Deposition of M@Pt active metals and evaluation of the resulting electrocatalsyts <u>Evaluation of the novel electrocatalysts</u> - Characterizations for the catalysts (Synchrotron analysis, TEM, XRD, etc.) - Electrochemical evaluations in half-cells and single cells			
Outcomes*	● Deliverables - Gram-scale metal-nitride/carbide nanoparticles and their synthesis processes - Mass activity of electrocatalysts : ≥ 0.44 A/$mg_{_PGM}$ - Structural and elemental characterizations on the supports and the catalysts ● Publications - More than 1 co-authored papers via the international cooperative project			