

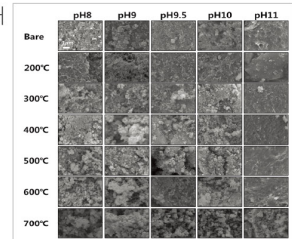
환경 오염이 적은 비귀금속 복합 금속 산화물 입자

Eco-friendly non-precious nanocomposite metal oxide particles

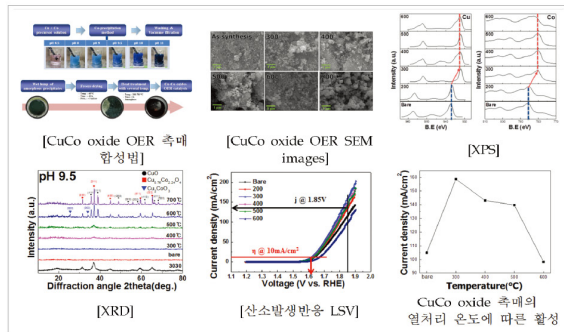
TRL3

기술내용

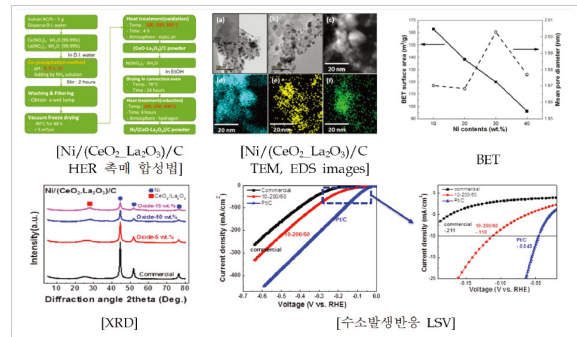
- 본 기술은 친환경 수소생산에 적합한 알칼라인 또는 음이온교환막 수전해 시스템에서 수소 및 산소 발생 전극의 촉매로 사용되는 비귀금속 복합 금속 산화물에 관한 것임
- 효율적이고 친환경적이며 대량생산이 용이한 합성 방법 개발
- 고활성 및 장기 안정성을 동시에 충족하는 비귀금속 나노 구조 촉매 개발 및 적용



산소발생촉매



수소발생촉매

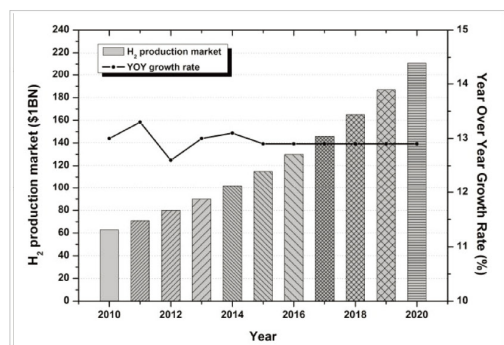


우수성

- 간단하고 효율적인 합성법(co-precipitation)을 통해 대량생산에 유리한 나노구조 복합 산화물 촉매 개발
 - 합성조건 최적화를 통한 고활성과 장기 내구성이 동시 확보된 수소 및 산소발생촉매 개발
 - 개발된 촉매의 수전해 시스템에 적용을 통한 촉매의 안정성 확인
- [특허] KR10-2017-0102613 물분해 장치

사업성

- 세계 평균 에너지소비 증가율은 1.6% 정도 이고 2030년 까지 수소 에너지 시장은 3000억 달러 규모에 이를 것으로 보이고 최종에너지 대비 수소사용량 비중은 2040년 약 15%까지 확대 될 것으로 전망됨
- 세계 수소시장은 2011년 875억 달러에서 연 평균 6.2% 성장하여 2016년 1,180억 달러로 증가할 것으로 예상 됨
- 출처 Hydrogen Generation Market - by Merchant & Captive Type, Distributed & Centralized Generation, Application & Technology - Trends & Global Forecasts (2011 - 2016)
- 수송용 및 정비용 연료전지, 화학연료 합성 분야에서 수소 사용 증대에 따른 수소 스테이션 및 on-site 생산 방식을 갖는 시스템의 수요가 증가 할 것으로 보임



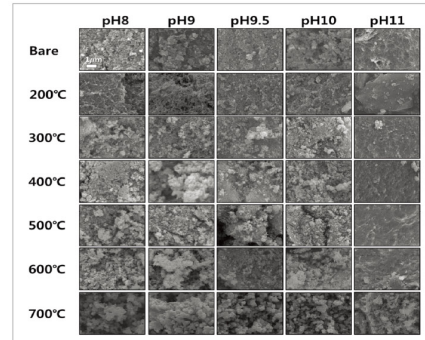
세계 수소 시장 규모 및 전망

Non-precious Metal Composite Oxide Particles for Hydrogen/Oxygen Evolution Reaction

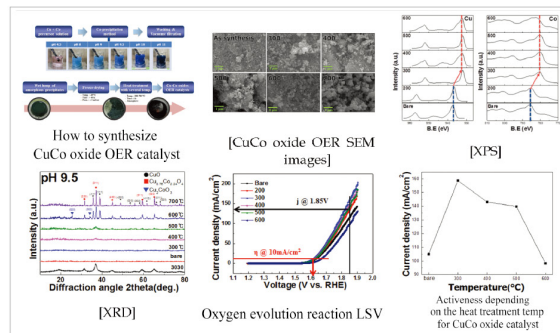
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Technology Overview

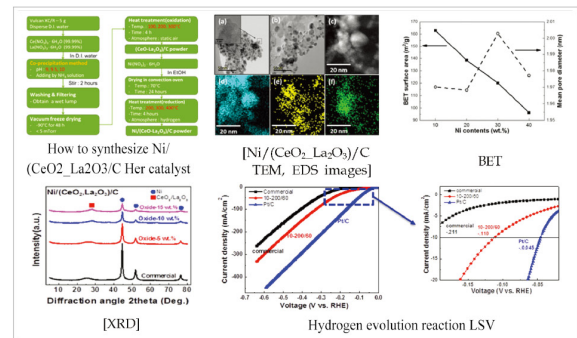
- This technology pertains to fabricating non-precious metal composite oxide used as a catalyst for hydrogen and oxygen evolution reaction electrodes in an anion exchange membrane (AEM) based water electrolyte system.
- The technology is more efficient, more eco-friendly and more suitable for mass production.
- Synthesis of the nano-structured catalyst made of non-precious metal and its oxide that can ensure high activeness and long term stability



Oxygen generating catalyst



Hydrogen generating catalyst

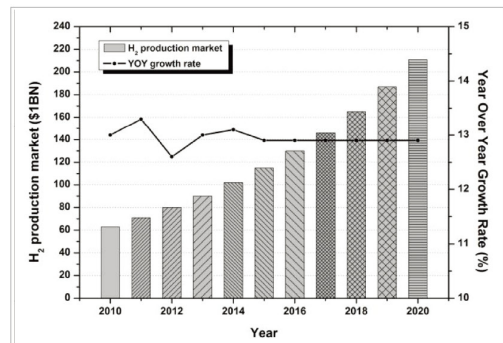


Highlights and Strengths

- Advantageous for mass production using simple and efficient synthesis method (co-precipitation & heat treatment)
- Development of highly active and durable catalysts through optimization of synthesis conditions
- Possible to apply the developed catalyst to water electrolyte system to confirm long-term stability
- [Patent] KR10-2017-0102613 WATER ELECTROLYSIS DEVICE

Business Cases

- The average growth of global energy consumption is 1.6 percent, and the hydrogen energy market will grow to \$300 billion by 2030. The share of hydrogen energy in total energy consumption will increase to 15% by 2040.
 - The global hydrogen market will grow by 6.2 percent per year from \$87.5 billion in 2011 to \$118 billion in 2016.
- [Source: Hydrogen Generation Market - by Merchant & Captive Type, Distributed & Centralized Generation, Application & Technology - Trends & Global Forecasts (2011 - 2016)]
- Hydrogen stations and on-site production systems will increase as more hydrogen is used in transport and stationary fuel cells and chemical fuel synthesis.



Global hydrogen market and prospects

<Plan to Develop Porous Metal for Energy/Environment, Ministry of Knowledge Economy (2013)>