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에너지융합기술 혁신인재 양성사업단

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중소기업기술혁신대전 '기술 혁신 유공', 중기부장관 표창

- 제22회 중소기업기술혁신대전서 기술 혁신 기여 공로 인정
- 고재필 교수·손영규 교수·윤진영 주무관, '중기부장관 표창'


고재필 교수


손영규 교수


윤진영 주무관

우리 대학이 제22회 중소기업기술혁신대전에서 중소기업 기술 혁신에 기여한 공로로 교수 및 직원 부문 '중소벤처기업부장관 표창'을 받았다.

교수 부문에서는 컴퓨터공학과 고재필 교수, 환경공학과 손영규 교수가 선정됐으며, 직원 부문에서는 중소기업산학협력센터 윤진영 주무관이 선정됐다.

고재필 교수는 산업현장에서 실제 활용 가능한 △머신비전을 위한 영상처리 △실용적 딥러닝 알고리즘 분석 △스포츠 중계방송 영상분석 등 상용 SW 관련 기술을 개발하고, 이를 통해 확보한 지적재산권을 수요 기업에 이전하며 기업 경쟁력 강화에 기여했다. 뿐만 아니라 지역 기업의 R&D 인력에 대한 딥러닝 교육 및 자문 등을 제공하며 기술 역량을 높이기 위해 노력했다.

손영규 교수는 환경공학 분야의 기술 개발을 바탕으로 지역 중소기업과 협업을 통해 지난 2016년부터 총 13건의 국가연구 개발과제를 수행했다. 또한 20여 건의 특허 출원·등록과 기술 이전을 통해 지역 기업의 기술 혁신을 이끌었으며, 우리 대학 환경분석센터장으로서 지역 환경 문제와 관련된 현안 해결을 위해 노력했다.

윤진영 주무관은 산학협력기술개발사업, 산학협력신사업R&D바우처사업 등 대학과 기업이 연계하여 진행하는 다양한 과제가 성공적으로 수행될 수 있도록 적극 지원한 공로로 이번 수상의 영예를 안았다.

제22회 중소기업기술혁신대전은 'K-혁신기업, 새로운 시작'을 주제로 오는 10월 30일까지 온·오프라인으로 진행된다. 우리 대학과 산학협력거점형플랫폼사업을 수행하고 있는 지역 기업인 ㈜티엘비즈, ㈜유씨테크놀로지, 엘텍㈜을 비롯해 맞춤형기술파트너지원사업에 참여하는 L.Line 등도 이번 행사에 함께 했다.

금오공과대학교 KIT People(2021.10.28.) https://www.kumoh.ac.kr/ko/sub01_05_02.do?mode=view&articleNo=331532&article.offset=9&articleLimit=9

◈ 관련 기사 ◈

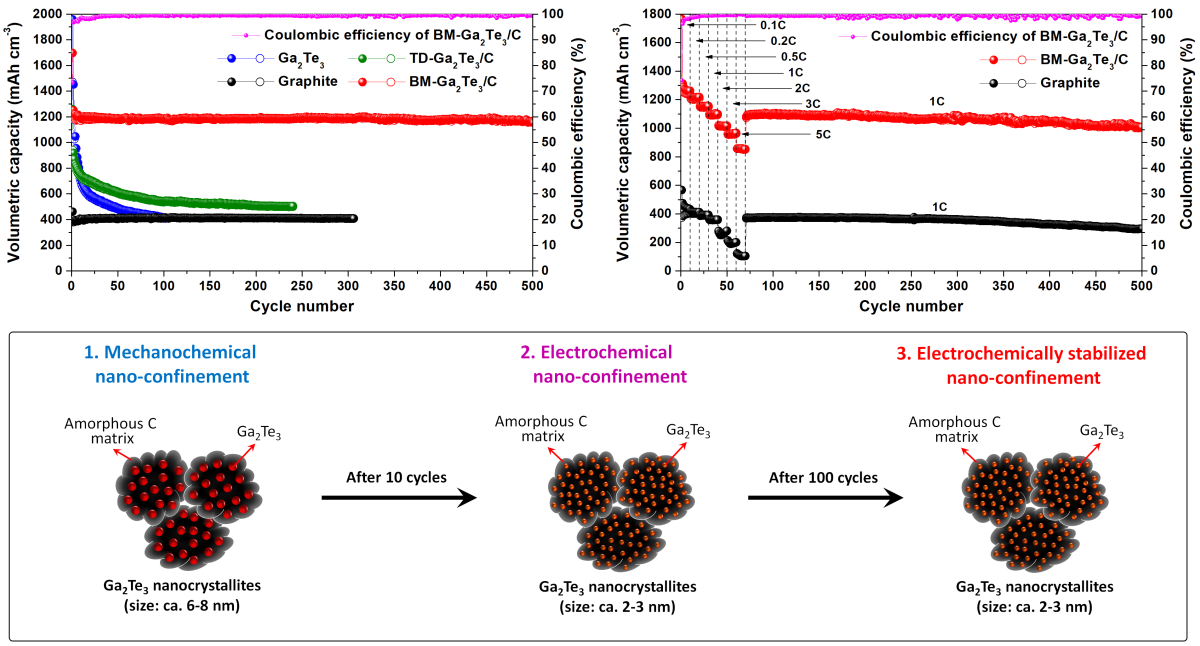
경북매일신문	금오공대 고재필·손영규 교수, 중소벤처부장관 표창	http://www.kbmaeil.com/news/articleView.html?idxno=912538
한국대학신문	금오공대 교직원, 중기부장관 표창	http://news.unn.net/news/articleView.html?idxno=518133
경북도민일보	금오공대 교수·직원 중기부장관 표창 받아	http://www.hidomin.com/news/articleView.html?idxno=466939
대구일보	금오공대 고재필 교수 등 3명, 제22회 중소기업기술혁신대전 중기부 장관 표창	http://www.idaegu.com/newsView/idg202110310083
머니투데이	금오공대 교직원, 기술 혁신 유공자 선정	https://news.mt.co.kr/mtview.php?no=2021102811587441548
교수신문	금오공대, 제22회 중소기업기술혁신대전 '중소벤처기업부장관 표창'	http://www.kyosu.net/news/articleView.html?idxno=79715
브릿지경제	2021 중소기업 기술혁신대전… 산학협력 공헌 대학·교직원 포상	http://www.viva100.com/main/view.php?key=20211103010000873

에너지저장

Journal of Materials Chemistry A
Volume 9, September 2021, p20553-20564 (Impact Factor : 12.732)

Novel high-performance Ga_2Te_3 anodes for Li-ion batteries

Young-Han Lee, Yoon Hwa*, Cheol-Min Park*



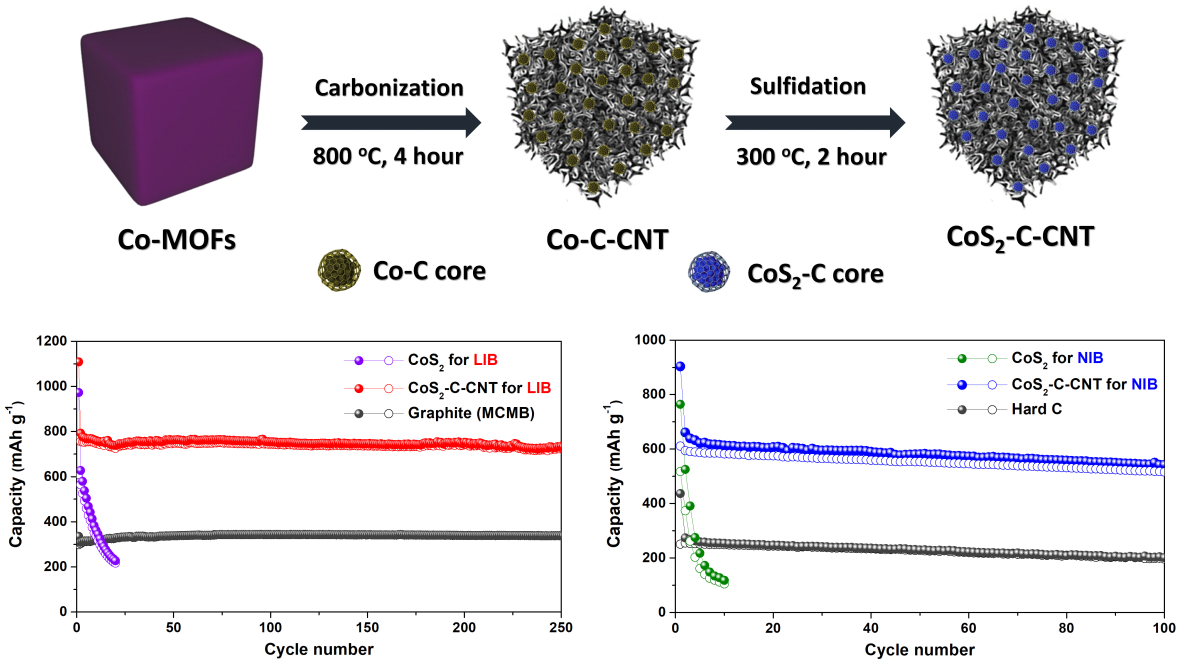
The development of high-capacity and high-power lithium-ion batteries (LIBs) is a key challenge to meet the increasing demand for advanced mobile electronics and electric vehicles. A novel high-capacity and high-power Ga_2Te_3 anode material for LIBs, which exhibits a distinctive reaction mechanism with Li ions, has been introduced in this study. Two types of Ga_2Te_3/C composite were prepared via different synthetic routes, namely carbon thermal decomposition (TD) and high-energy ball milling (BM), to improve the electrochemical performance of Ga_2Te_3 anodes, and their electrochemical performances were compared. The electrochemical evaluation results indicate that the Ga_2Te_3/C composite produced by BM (BM-Ga2Te3/C) showed better electrochemical performance by delivering much smaller Ga_2Te_3 nanocrystallites than the Ga_2Te_3/C composite produced by TD (TD-Ga_2Te_3/C). Furthermore, the BM-Ga_2Te_3/C anode showed a highly reversible initial volumetric capacity (1245 mAh cm^{-3}), stable capacity retention (93.2% after 500 cycles), and excellent high-rate performance (~1000 mAh cm^{-3} at 1C after 500 cycles). These high electrochemical performances, which were demonstrated via ex situ analyses, were attained by a unique three-step nano-confinement process of Ga_2Te_3 in BM-Ga_2Te_3/C. Thus, this study provides a new material development strategy of employing mechano- and electro-chemical nano-confinement processes to develop high-performance anodes for LIBs.

에너지저장

Composites Part B: Engineering
Volume 231, February 2022, p109592 (Impact Factor : 9.078)

Robust nanocube framework CoS_2-based composites as high-performance anodes for Li- and Na-ion batteries

Vinoth Ganesan, Do-Hyeon Kim, Ki-Hun Nam, Cheol-Min Park*



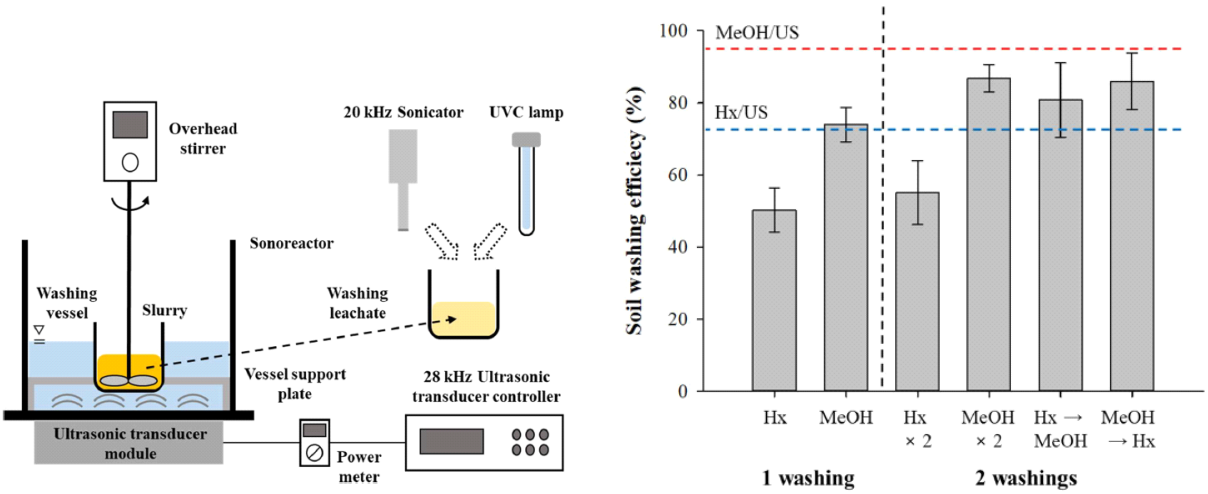
Robust hierarchical nanocube framework CoS_2-based composites comprising of nanocrystalline CoS_2 (~8-10 nm) encapsulated in a robust carbon-core matrix entangled in carbon nanotubes (CNTs) were synthesized, and their performance as electrodes for Li-ion batteries (LIBs) and Na-ion batteries (NIBs) was evaluated. The robust nanocube framework CoS_2-C-CNT composites were synthesized from Co-based metal-organic frameworks by an efficient two-step synthesis process of carbonization and sulfidation. The structural phase change mechanism of CoS2 was systematically characterized by ex situ analysis tools, which revealed that it involved a conversion during Li/Na-insertion and a recombination reaction during Li/Na-extraction. The unique structural characteristics of the nanocube framework CoS_2-C-CNT composites and the unique structural phase change mechanism of CoS_2 are attributed to the superior Li/Na-storage performances. The nanocube framework CoS_2-C-CNT composites delivered a large reversible capacity (LIB: 770 mAh g^{-1} and NIB: 629 mAh g^{-1}), excellent cycling (LIB: 726 mAh g^{-1} after 250 cycles and NIB: 531 mAh g^{-1} after 100 cycles), and fast rate behavior (LIB: 613 mAh g^{-1} at 3C and NIB: 391 mAh g^{-1} at 2C rates). This remarkable robust nanocube framework composite structure is highly applicable to various LIB/NIB electrode materials owing to their excellent Li/Na-ion storage characteristics.

환경에너지

Ultrasonics Sonochemistry
Volume 80, December 2021, p.105825 (Impact Factor : 7.491)

Ultrasound-assisted soil washing processes using organic solvents for the remediation of PCBs-contaminated soils

Dukyoung Lee, Younggyu Son*



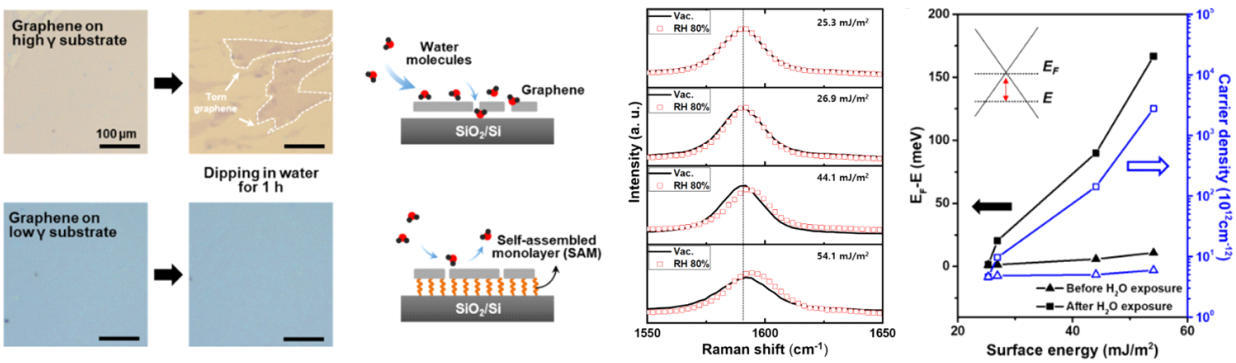
Ultrasonic soil washing processes using organic solvents were investigated for the development of novel remediation technologies for persistent organic pollutants (POPs)-contaminated soils. Aluminum foil erosion was first tested to understand sonophysical activity in water, methanol (polar) and n-hexane (nonpolar) in a 28 kHz double-bath-type sonoreactor. Significant sonophysical damage on the aluminum foil was observed at the antinodes for all solvents, and the order of degree of sonophysical damage was as follows: water > methanol > n-hexane. Subsequently, conventional (mechanical mixing only) and ultrasonic soil washing (mechanical mixing and ultrasound) techniques were compared for the removal of polychlorinated biphenyls (PCBs) from soil. Two types of contaminated soils, fresh (Soil A, C_0 = 2.5 mg/kg) and weathered (Soil B, C_0 = 0.5 mg/kg), were used and the applied soil-to-liquid (S:L) ratio was 1:5 and 1:10 for methanol and n-hexane, respectively. The polar solvent significantly increased washing efficiencies compared to the nonpolar solvent, despite the nonpolar nature of the PCBs. Washing efficiency was significantly enhanced in ultrasonic soil washing compared to conventional washing, owing to macro- and micro-scale sonophysical actions. The highest washing efficiencies of 90% for Soil A and 70% for Soil B were observed in the ultrasonic washing processes using methanol. Additionally, a single operation of the ultrasonic washing process was superior to two sequential processes with conventional mixing in terms of washing efficiency, consumption of washing agents, treatment of washing leachate, and operation time. Finally, the removal of PCBs in an organic solvent (methanol) was investigated in photolytic and sonolytic processes for the post-treatment of soil washing leachate. A photolysis efficiency of 80% was obtained within 60 min of UV exposure for intensities of 1.0, 2.0, and 4.0 W/cm^2. The primary mechanism of PCBs degradation is photolytic dechlorination. In contrast, no degradation was detected in the sonolytic process, as the excess organic solvent acted as a strong radical scavenger.

에너지변환

Sensors and Actuators B: Chemical
Volume 347, November 2021, p130579 (Impact Factor : 7.460)

Improved Moisture Stability of Graphene Transistors by Controlling Water Molecule Adsorption

Eunho Lee, Hyungsub Lim, Nam-Suk Lee, Hyun Ho Kim



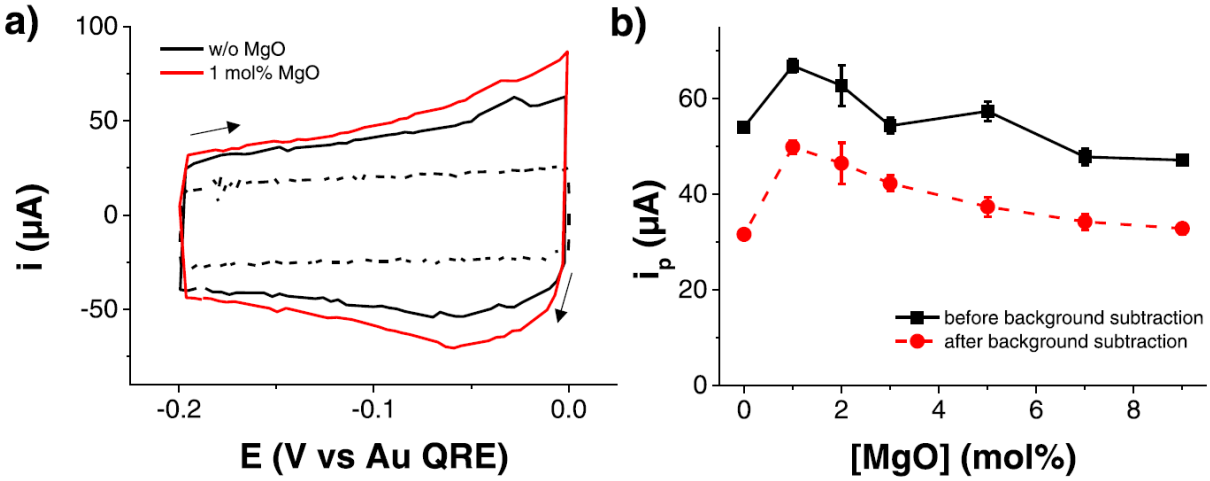
Although atomically thin two-dimensional graphene is of interest for next-generation electronic device applications owing to its outstanding properties, a crucial issue concerning the stable operation of graphene-based devices under ambient conditions still remains for industrial applications. Because the electrical performance of graphene-based devices is largely affected by polar atmospheric species such as water molecules (H_2O), it is important to eliminate this detrimental effect. In the present study, we report a facile method to enhance the moisture stability of graphene field-effect transistors (FETs) by modulating the surface energy of substrates. We found that this simple method enables us not only to retain the way to secure field-effect mobility, but also to improve the stability of graphene FETs. The device on the surface-modulated substrates showed excellent moisture stability, even under harsh humid environments. We expect that the proposed method will be widely useful for the improvement of ambient stability in various 2D material-based electronics.

수소에너지

Journal of The Electrochemical Society
168, December 2021, 124503 (Impact Factor : 4.316)

Electrochemical Study on MgO as an Additive in Molten Li_2CO_3-Na_2CO_3 for Molten Carbonate Fuel Cells

MChan Mi Kim, In Ui Kim, Sung Pil Yoon, and Sung Ki Cho*



This study investigates the effect of MgO as an additive in molten $Li2CO_3$-Na_2CO_3 electrolyte for molten carbonate fuel cells through electrochemical analyses. Addition of MgO (1~5 mol%) increased the electrochemical response in cyclic voltammogram of peroxide in molten $Li2CO_3$-Na_2CO_3. The diffusion coefficient of peroxide in molten $Li2CO_3$-Na_2CO_3 containing MgO was determined via the comparison between the peak currents of cyclic voltammograms from microwire electrode and macrowire electrode. The addition of MgO did not impact the diffusion coefficient, indicating that the increase in the electrochemical response with the addition of MgO might be attributed to the increase in the peroxide concentration. The change in peroxide concentration was also confirmed by electrochemical impedance analyses, which exhibited a decrease in the charge transfer resistance. The increase in the concentration of peroxide with the addition of MgO might be associated with the high thermal decomposition constant of $MgCO_3$, implying the high concentration of oxide ion in the molten $Li2CO_3$-Na_2CO_3. This study suggests that MgO might be an effective additive for increasing the oxygen solubility in the molten $Li2CO_3$-Na_2CO_3, and subsequently for enhancing the performance of molten carbonate fuel cells.