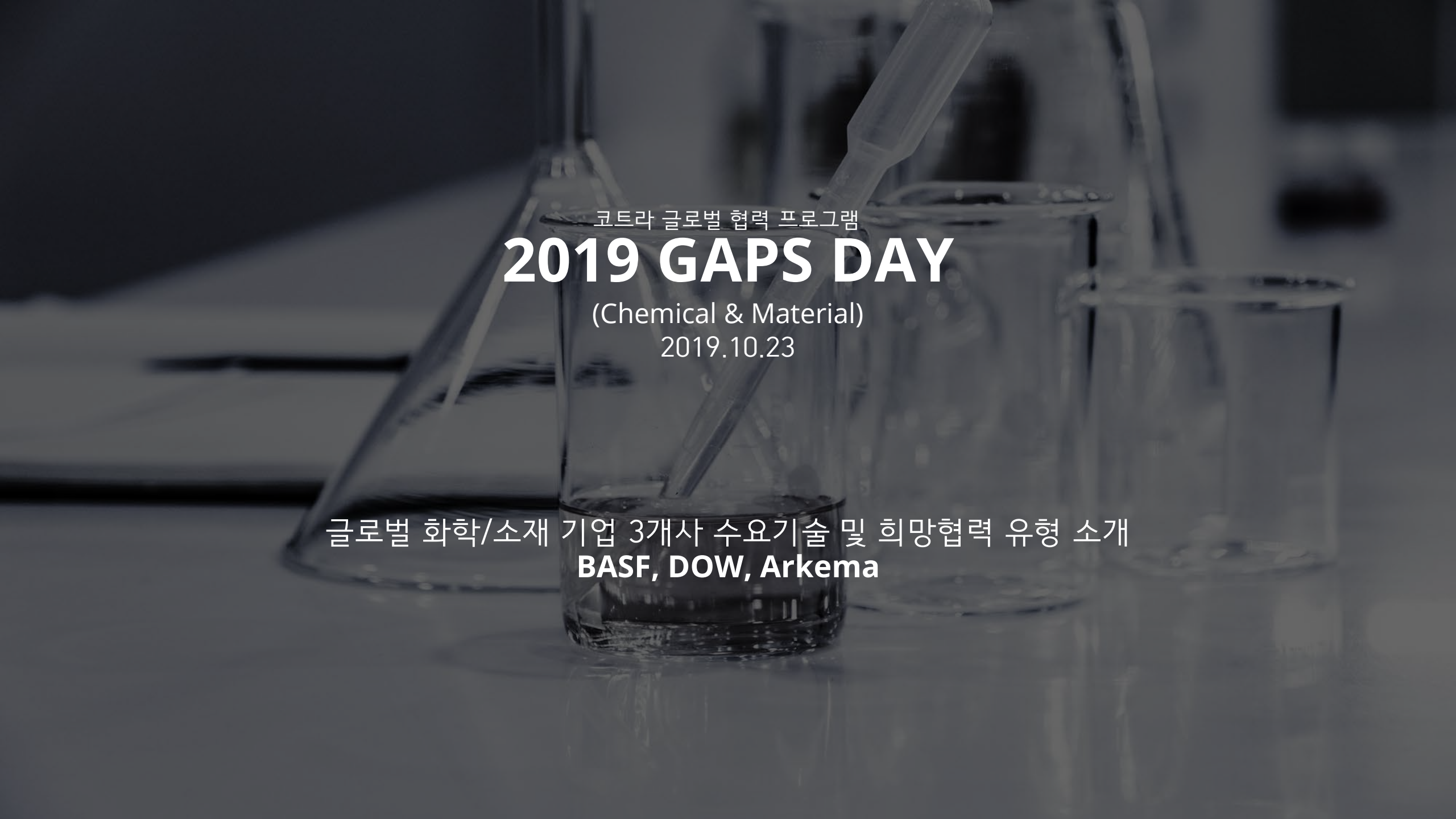

코트라 글로벌 협력 프로그램

2019 GAPS DAY

(Chemical & Material)

2019.10.23

글로벌 화학/소재 기업 3개사 수요기술 및 희망협력 유형 소개

BASF, DOW, Arkema

BASF

BASF는 지속가능한 미래에 이바지하고자 하며, 세계를 선도하는 글로벌 화학 전문 기업으로서 경제적 성공과 함께 환경 보호, 사회적 책임을 추구합니다.

BASF Group에 근무하는 전 세계 약 12만 2000명의 임직원은 다양한 산업 분야와 많은 국가에서 고객의 성공적인 활동을 지원하고 있습니다.

2018년 12월 31일까지 BASF의 포트폴리오는 화학 제품, 퍼포먼스 제품, 기능성 소재 및 솔루션, 농업 솔루션의 4개 사업분야로 구성되었으며,

2019년 1월 1일부로 BASF는 기존 사업 분야를 화학 제품, 원재료, 산업 솔루션, 표면처리 기술, 뉴트리션 & 케어, 농업 솔루션 등의 6개 사업분야로 재편했습니다.

www.basf.com

	Technology Request
Title	1. New catalysts and chemistry enabling fast, ultra-deep curing 2. Pulsed laser reflective materials and meta-materials for LiDAR sensor 3. Advanced chemistry and materials for extreme ultraviolet (EUV) photoresists and related materials 4. New catalysts, coating technology and related materials enabling superionic conducting in all-solid-state battery systems 5. NAS(Sodium Sulfur) battery system for ESS (energy storage system)
Description	1. Continuous innovations in chemistry and materials have contributed to the development of advanced curable materials and processes. For example, radical generator-based polymerization has enabled low cost, fast and eco-friendly curing processes and even low energy consumption compared to thermal curing. However, despite these advances, fast curing of thick and high pigment systems, which currently requires high energy consumption and complex curing processes, is still a challenge in coating industry. In addition, due to the much higher pressure on the reduction of carbon dioxide and volatile organic chemicals (VOCs) in recent years, the need for non-toxic, inexpensive, and eco-friendly curable materials is increasing rapidly. Thus, we are interested in catalysts and related innovative chemicals / materials to solve the problem. 2. Nowadays, advanced driver assistant systems (ADAS) are driving new innovations in transportation, for example, autonomous cars. For realization, resolving all safety issues is a top priority and has facilitated the development of advanced sensor technology and related components. For example, LiDAR sensors are of great interest, but there are issues that are not revealed beyond cost and complex system. Interference of light interference by the surrounding environment and low reflection of pulsed lasers in pigmented coatings of cars (e.g., dark tone). This can lead to serious accidents due to incorrect communication of moving vehicles or the surrounding environment. As an assistive technology, the need to selectively amplify pulsed lasers from matrices (e.g., cars, clothing) is emerging. Hence, we are interested in new materials or metamaterials that enable amplification or selective reflection of pulsed lasers.

Description	3. With the advent of new technologies such as artificial intelligence (A.I.) and advanced driver assistance systems (ADAS), securing high-performance semiconductor manufacturing technology is very urgent. In particular, as the EUV process emerges as a core technology in semiconductor manufacturing, demand for related materials and process technologies is rapidly increasing. More specifically, photoresist and related material technologies capable of nano (<7 nm) patterning processes are very important and we are interested in finding new concepts and ideas. 4. The great demand for safe, high power and energy densities in battery technology promoted the development of advanced solid electrolyte-based battery systems. For those upcoming new battery technologies, we are looking forward to seeing your novel ideas in chemistry and materials enabling fast commercialization. Specifically, we are interested in not only new catalysts enabling more higher energy densities, but also coating technology and related materials for unification in the battery interface. 5. BASF & NGK have NAS (Sodium sulfur) battery for large scale (1 MWh ~ 100's MWh) and long duration (~ 6 hr) energy storage system (ESS). The NAS battery system is not based Lithium ion battery which can be free from recent fire incidents of ESS https://www.basf.com/global/en/media/news-releases/2019/06/p-19-241.html
Technical Specification or Expertise Sought	1. Enable deep curing for high thick (desirably, > 1.0 cm) and high pigmented systems Enable UV curing (~ 50 mJ/cm^2), or fast thermal curing at low-temperature (< 80 ^{o}C) Enable coating and films ultra-high durability (chemical & weather resistance, anti-scratchable, etc.) Provide ultra-high clearance & optical transparency (> 90 % at 550 nm) 2. Expertise sought: designing of advanced materials (or meta-materials) and fabrication technologies (coating, film, etc.) 3. Expertise includes all kind of chemistry and materials capable of nano-patterning (< 7 nm) via EUV process. 4. Expertise includes all kind of chemistry and materials capable of high energy densities (desirably, > 1000 Wh/kg). Expertise includes formulation, coating and printing technologies. 5. ESS system integrators who are looking for alternative battery technology replacing Lithium-ion battery. ESS project developers for renewables-combined, or peak shifting for commercial buildings, or new application ideas. BASF supplies NAS battery system (NAS battery + BMS in 20ft containers, 200kW/1.2MWh per container) and open for new business ideas with NAS battery systems
Type of Partnership Considered	Gate 1 (1 year): Joint study (for proof of concept) Gate 2 (3 years): Collaboration for full-development Gate 3: build-up J/V

DOW

DOW (NYSE: DOW)는 인류 진보에 필수적인 것들을 끊임없이 향상시키기 위해 과학과 기술력을 결합시키고 있으며 원료, 고분자, 화학 및 생물학 분야의 전문 기술을 융합하여 혁신적인 가치를 창출함으로써 청정수는 물론 청정 에너지 생산과 보존 등 세계적으로 가장 시급한 문제들을 해결하는 지속가능한 재료 과학 회사입니다.

DOW의 고성능 재료 및 산업 중간체, 플라스틱 비즈니스는 패키징, 인프라 및 고객 관리와 같은 고성장 분야의 광범위하고 차별화된 과학 기반의 제품과 솔루션을 제공합니다.

DOW는 31개국의 113개의 제조 공장에서 약 37,000명의 직원이 함께 일하고 있으며, 2018년 기준 약 500억 달러의 매출을 올렸습니다.

www.dow.com

	Technology Request
Title	Applied material technology that will be applied for emerging industry in Korea
Description	▪ Advanced material technology that will be applied for Display and/or Electronics application. ▪ Advanced material technology that will be applied for Electrical Vehicle and/or Hydrogen fuel cell vehicle. ▪ Advanced material technology that will be applied for 5G device and/or Data centre. ▪ Advanced material technology that can realize flame-retardancy and/or thermal insulation for Building and Ship industry.
Technical Specification or Expertise Sought	▪ Equipped with dedicated R&D facility for unique material technology described above. And/or ▪ Equipped with dedicated basic pilot scale up process for unique material technology described above
Type of Partnership Considered	We would be open to different types of partnership format depending on the final outcome of this project. We will have to review factors such as the level of technology involved, potential market size, the level of collaboration and alliance required, etc. before we can make the final decision.

Arkema

글로벌 화학회사이자 프랑스 최고의 화학제품 생산 회사인 Arkema는 화학 산업의 미래를 만들어 가고 있습니다.

책임감 있고 혁신적인 접근을 통해 최첨단의 특수 화학 제품을 제공하여 고객들이 기후 변화, 식수난, 미래 에너지, 화석연료 고갈 및 경량 소재 필요성 등과 같은 도전적인 과제를 해결할 수 있도록 실용적인 솔루션을 제공합니다.

Arkema의 사업은 고기능성 소재, 산업용 특수제품 그리고 코팅 솔루션 등 3개의 사업 영역으로 나누어져 있습니다.

전 세계 55여개 국가에서 약 20,000여명의 직원들이 근무하고 있습니다. 이를 통해 연간 약 87억 유로의 매출을 기록하고 있고, 또한 각 사업 포트폴리오에서 세계적으로 인정받는 브랜드를 지니고 시장 선두의 자리를 지키고 있습니다.

www.arkema.com

	Technology Request
Title	▪ Piezoelectric application ▪ Thermoplastic composites ▪ Solid electrolyte for batteries
Description	▪ **Piezoelectric application** ARKEMA Piezotech® develops a range of fluorinated electroactive polymers and inks. Materials of the future, these polymers are an inexhaustible source of innovation. Their properties of ferroelectricity, piezoelectricity, pyroelectricity and electroactive give rise to a wide range of applications in the fields of robotics, aeronautics, medical, automotive, plastronic, wearable, internet of things and printed electronics. ARKEMA Piezotech® provides and develops ranges of powder, ink and device. ▪ **Thermoplastic composites** Rilsan® Matrix is a series of high temperature, high performance polyamide resins especially designed for light weight automotive composites. These resins are filled with either carbon fibers or glass fibers and are supplied in the form of unidirectional tapes. They enable the manufacture of composite parts using new and innovative processes designed for the high output requirements of this industry. ▪ **Solid electrolyte for batteries** Performance of electrolyte lithium salts is highly dependent on their purity. Using expertise in both fluorochemicals and industrial processes, Arkema has developed two new ultra pure LiFSI and LiTDI salts. In addition to it, ARKEMA has developed special polymers for solid electrolyte and formulations of solid electrolyte.
Technical Specification or Expertise Sought	▪ **Piezoelectric application:** Expertise in poled film ▪ **Thermoplastic composites:** ½, 1 inch carbon UD – reactive polyamide tape ▪ **Solid electrolyte for batteries:** Solid electrolyte in solid state batteries
Type of Partnership Considered	▪ Joint-venture ▪ OEM / tolling ▪ Technical cooperation

About GAPS

GAPS (Global Alliance Project Series)는,

2008년부터 KOTRA가 주최하는 프로그램으로서, 글로벌 기업의 다양한 한국 투자 기회를 제공하고, 국내 중소중견기업의 글로벌 진출을 지원하는 글로벌 다중 협력 사업입니다.

이를 통해, 글로벌 기업의 Green field 투자 외 국내 기업과의 기술협력, 마케팅채널공유 등 다양한 협력 관계를 제공하여, 투자를 촉진하고, 국내기업은 글로벌 기업과의 JV 설립, 협력 R&D 수행 등을 통해 세계 진출 기회로 삼을 수 있습니다.