

# Compact Heat Exchanger & Thermal Management



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❖ Delegate, Assembly for Int. Heat Transfer Conference

❖ Scientific Council, International Center for Heat and Mass Transfer

❖ Executive Board, Asian Union Thermal Science and Engineering

❖ Editor-in-Chief, Int. J. of Air-Conditioning and Refrigeration

## 주요 연구 분야

### 1. 열전달 성능향상 및 2상-유동

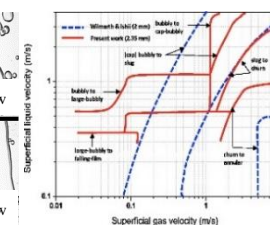
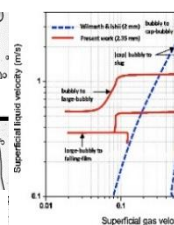
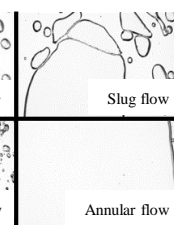
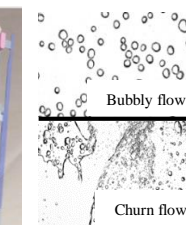
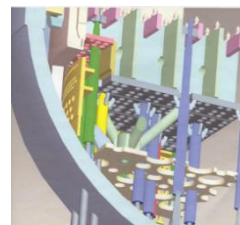
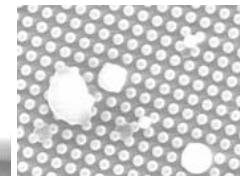
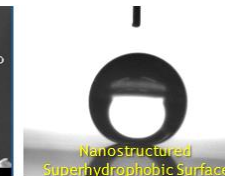
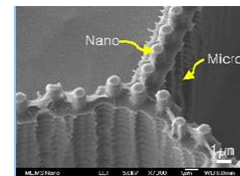
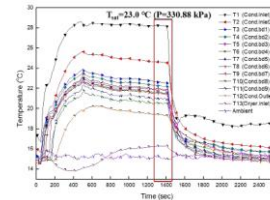
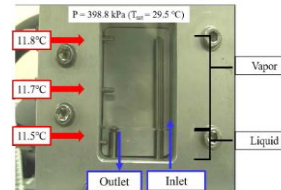
- 열전달 촉진, 증발/응축 상변화 열전달
- 2상-유동의 유동양식 평가
- 동물 호흡기의 열/물질 전달 해석

### 2. 냉동 및 열교환기 시스템 개발

- 냉매 열물성 및 열전달
- 냉동/히트펌프 시스템 해석 및 설계
- 고성능/고효율 열교환기 설계기술

### 3. 원자력 발전소 안전

- 원자력 발전소 안전 해석





# Two-Phase Flow & Phase Change Heat Transfer

## ● 소수성 표면 및 액적응축 구현

(a) 1.5 $\mu$ m, 1:1 ratio



38.44 kW/m<sup>2</sup>

42.18 kW/m<sup>2</sup>

56.09 kW/m<sup>2</sup>

(b) 1.5 $\mu$ m, 1:2 ratio

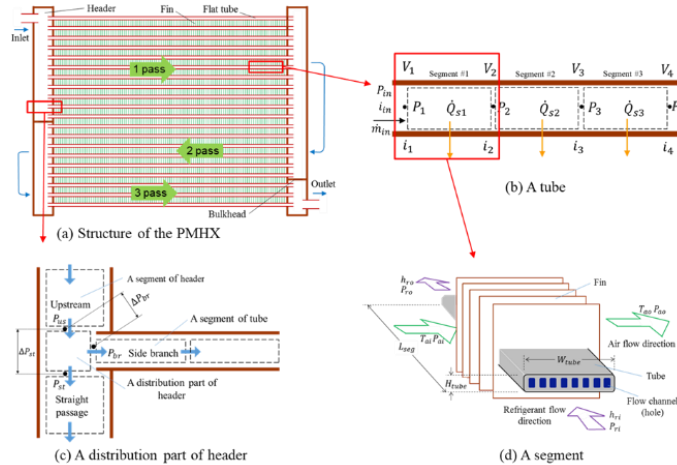


39.41 kW/m<sup>2</sup>

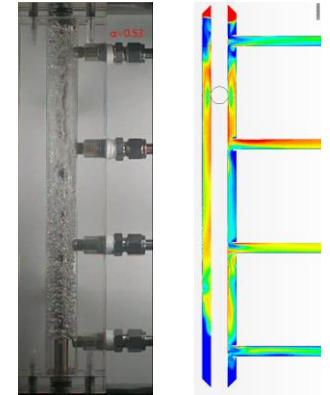
41.18 kW/m<sup>2</sup>

56.96 kW/m<sup>2</sup>

## ● HEX 2상 유동 분배

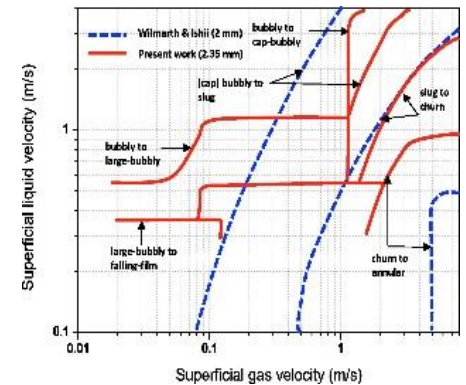
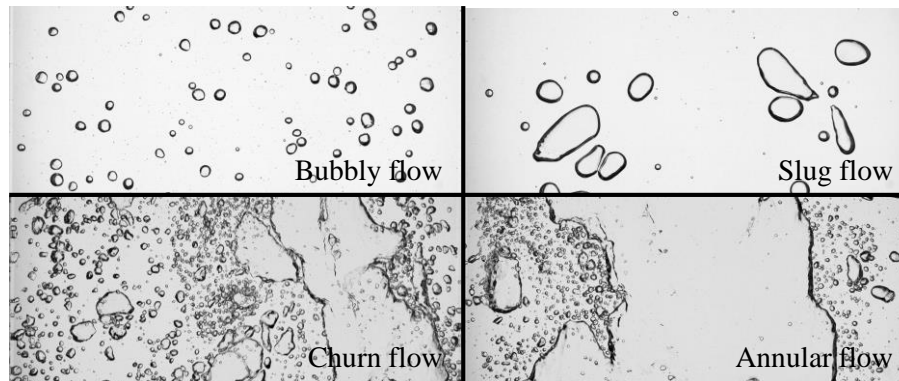
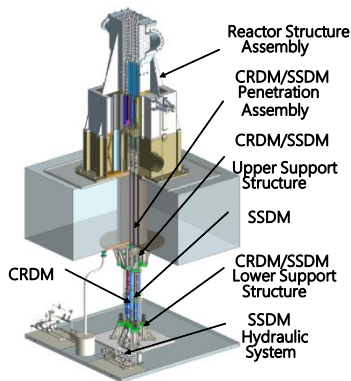


## ● 2상 유동 분배



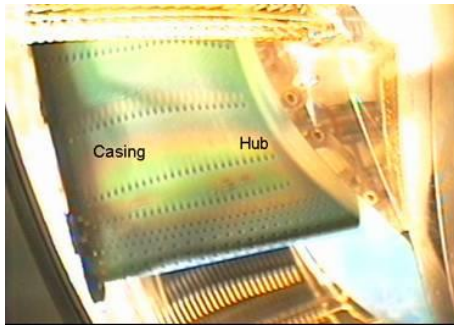
## ● 연구용 원자로 판형핵연료 유로의 수력학적 특성 연구

- 사각유로의 유동양식 평가 및 기존 사각유로의 2상-유동모델 개선

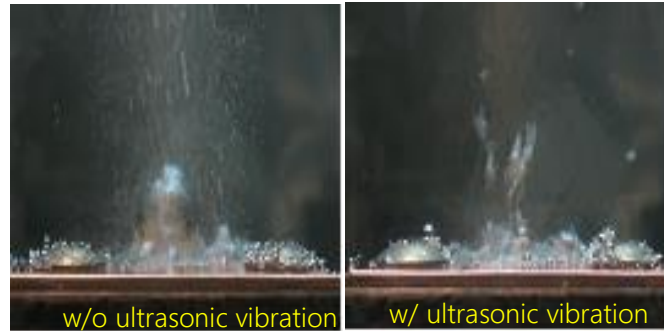


# Heat Transfer Enhancement Technology

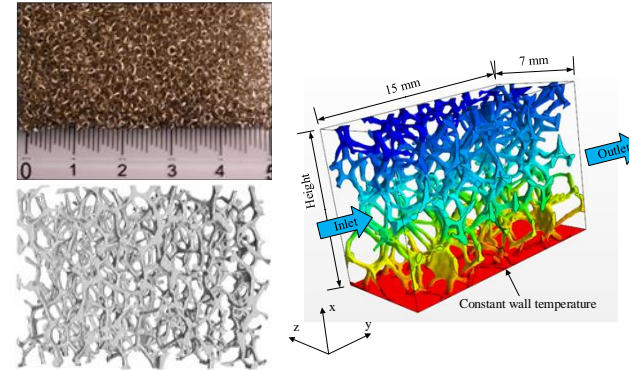
- NGV film cooling



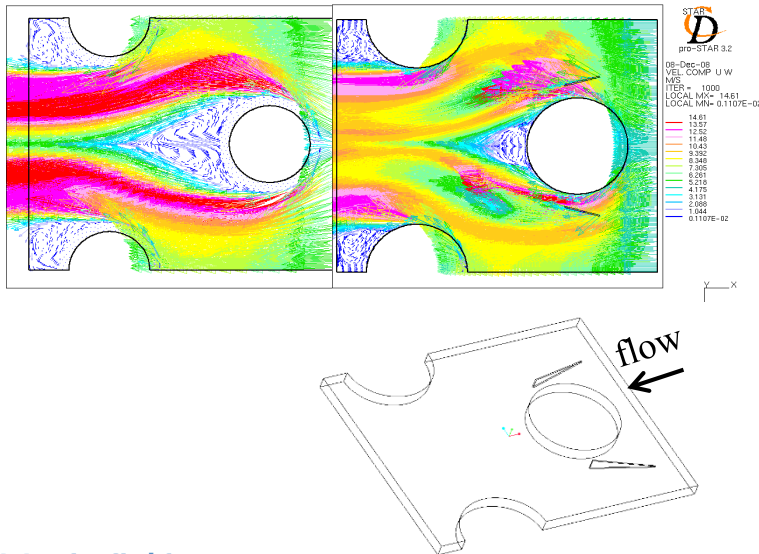
- 초음파 이용 증발열전달 촉진



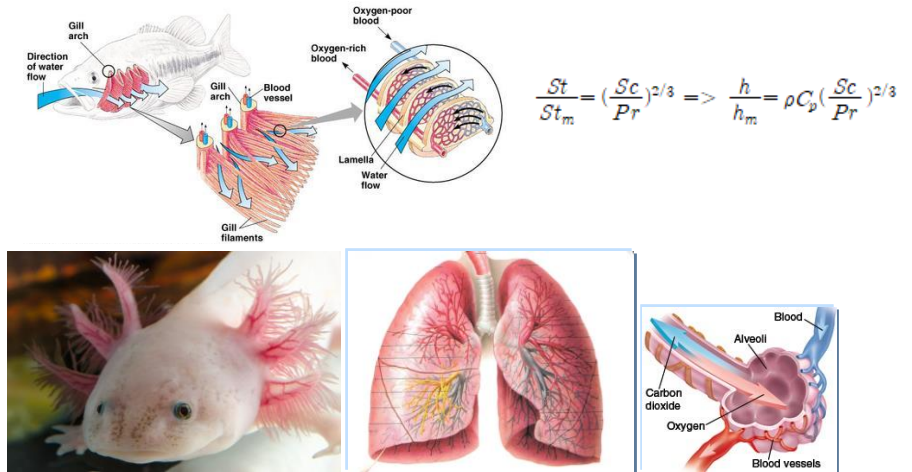
- Porous metal



- Vortex generator

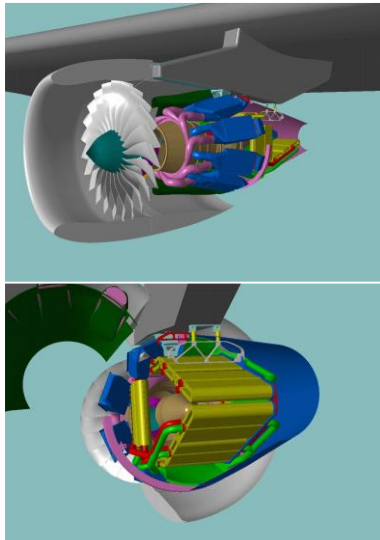


- 동물 호흡기 모사한 열전달 기구 개발



# Compact Heat Exchangers

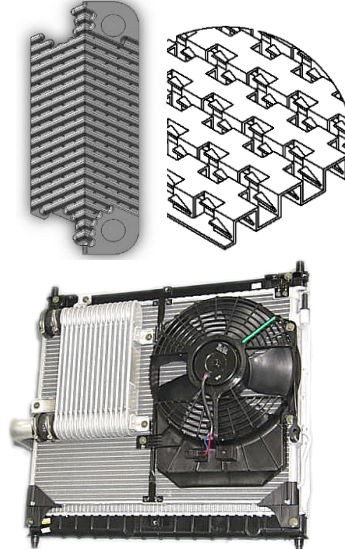
- 항공기 HEX



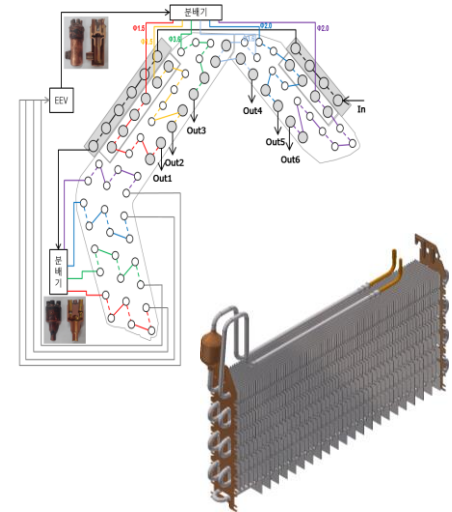
- 원자력발전소 HEX



- 전기차 HEX

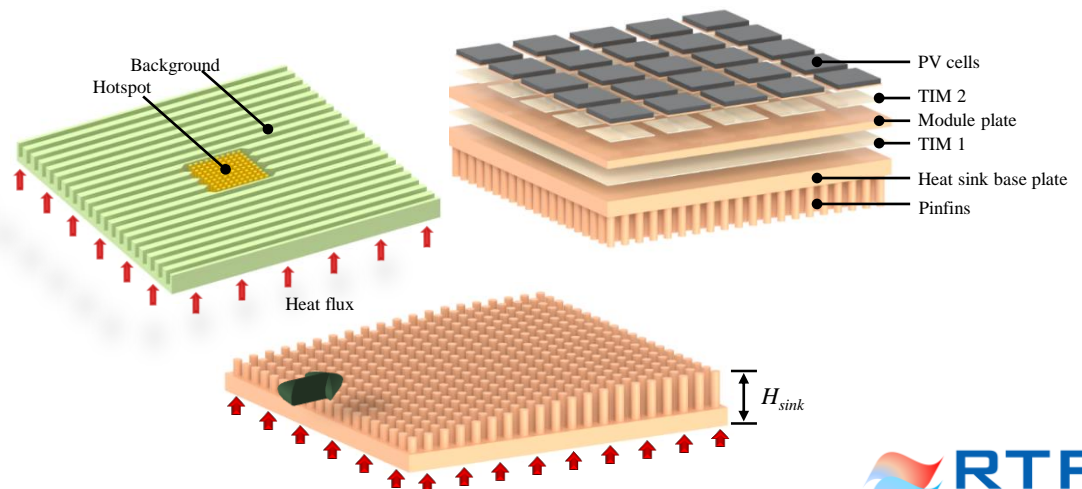
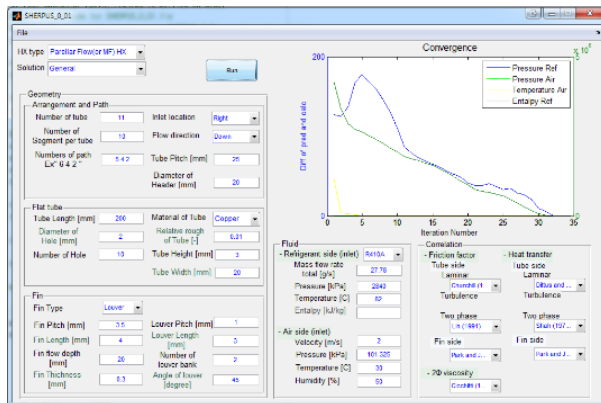


- 에어컨/냉장고 HEX



- 열교환기 S/W (판형, 환관, 마이크로채널)

- Pin fins for hot spot management



# Thermal Management of EV

- Thermal management system of electric vehicle

EGR Module	EGR Cooler(승용)	EGR Cooler(상용)	Oil Cooler	ATF Warmer	EGR Pipe	EGR Valve
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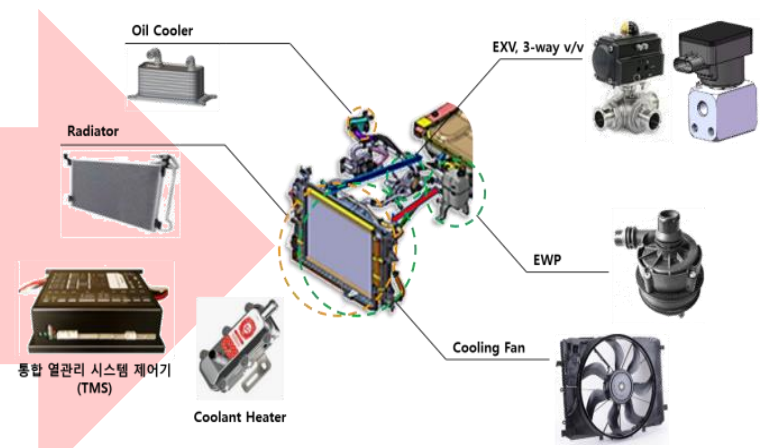


내연기관 엔진부품



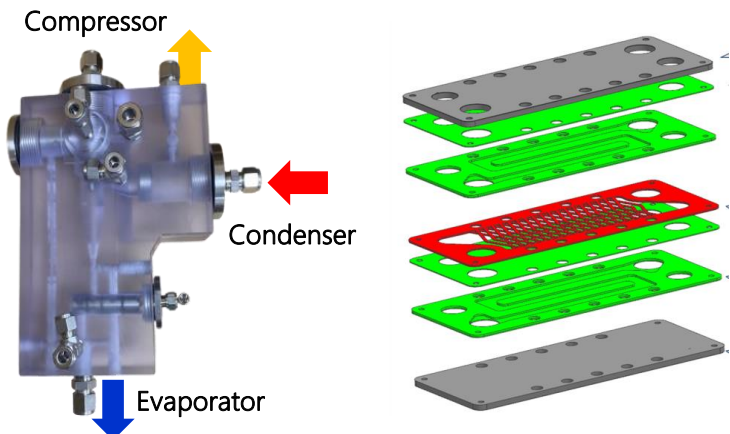
EGR Module

친환경 자동차 산업 발전과 배기가스 저감을 위한 코헨스글로벌의 자동차 부품

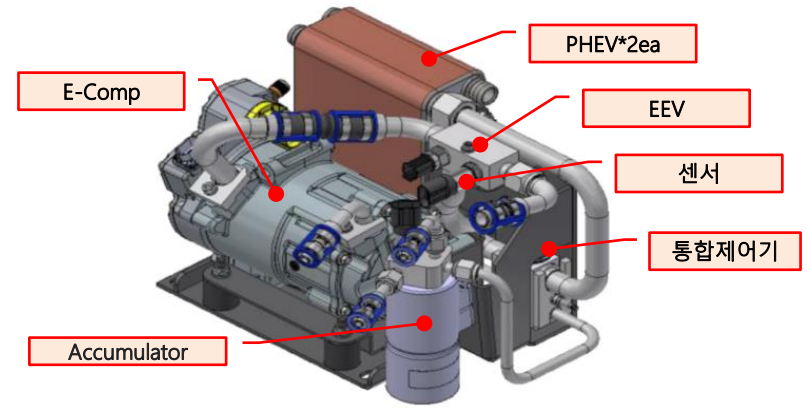


전력기반 열관리시스템 모듈부품

- Components: EEV, PHEX

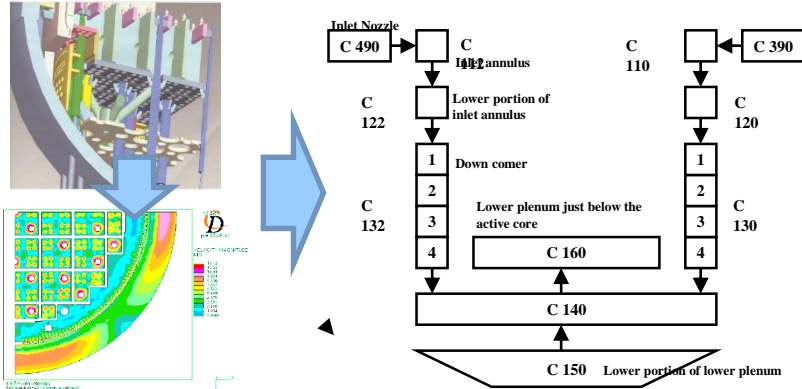


- TMS Module for EV Platform (CO<sub>2</sub>, R290)

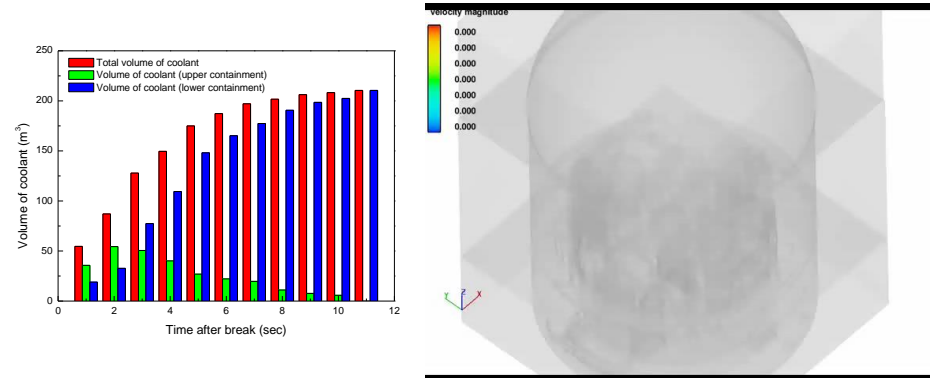


# Nuclear Power Plant Safety

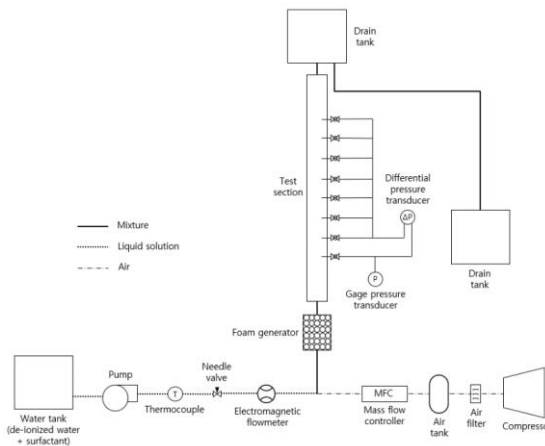
- CFD를 이용한 PWR 압력 손실 계수 평가



- CFD를 이용한 대형배관 파단 방출유량 평가



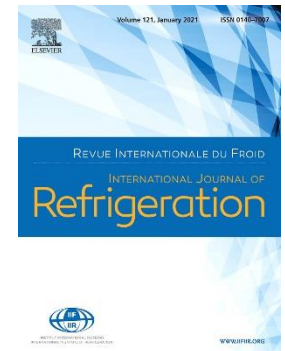
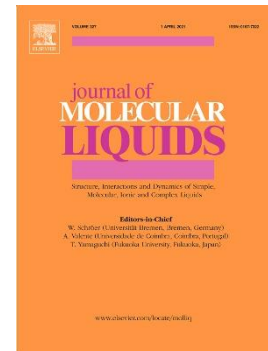
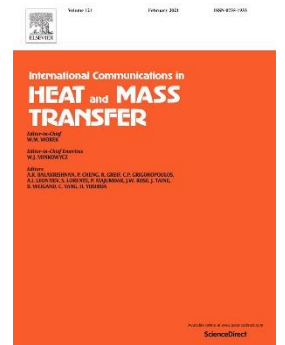
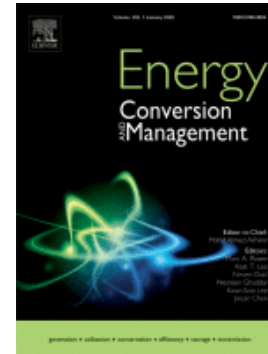
- 원전폐로시 제염위한 거품유동 유동 모델개발



# 학술 활동

## ◆ 3년간 게재된 저널 (SCI)

- 냉동분야 최고 권위 저널 : 3 편
- 에너지 분야 Q1 저널 : 18 편
- 화학 및 물리학 분야 상위 10% : 3 편



# 대학원생 교외 활동



# 졸업 후 진로

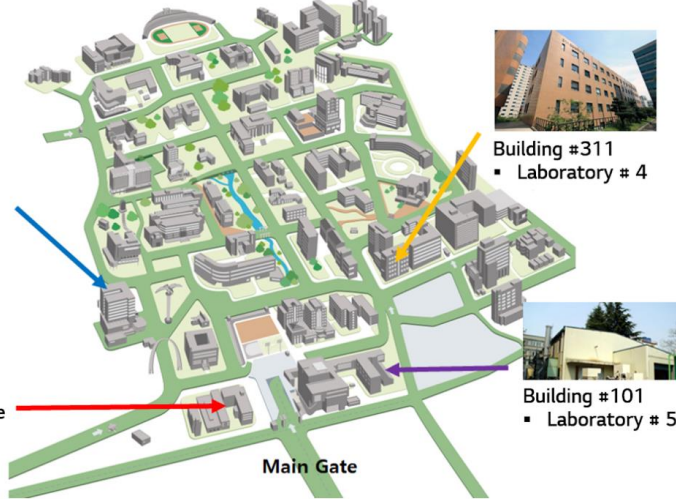
Refrigeration system & Thermo-Fluid Laboratory



Building #303 (M관)  
❖ Professor office  
▪ Laboratory # 1



Building #105  
❖ Student Main office  
▪ Laboratory # 2  
▪ Laboratory # 3



Building #311  
▪ Laboratory # 4



Building #101  
▪ Laboratory # 5

## ◆ 최근 5년간 졸업생 취업 현황

- 대학교수 : 3 명
- 국공립 연구소 : 1 명
- 공기업 : 1 명
- 대기업 : LG전자 (8 명), 현대자동차 (2 명),  
현대로템 (1 명), 삼성전자 (2 명), 미쓰비시전자(1 명)
- 외국계 : 1 명

## 구성원

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- 연구교수 : 3명
- 학생 :  
박사과정 : 5 명  
석사과정 : 11 명  
교환학생 : 1 명  
학부연구생 : 3 명



Welcome RTF

## ◆ 전체 졸업생 취업 현황

- 원자력 및 방산 계열  
KAERI (한국원자력연구원), KHNP-CRI 및 KHNP (한국수력원자력 중앙연구소 및 한국수력원자력), KINS (한국원자력안전기술원), KNFC (한전원자력연료), KITECH (생산기술연구원), DTAQ (국방기술품질원), 한화테크윈 etc.
- 냉동 시스템 계열  
Professor, Samsung electronics, LG electronics & LG electronics CTO, Hanon System, Kyung Dong NAVIEN R&D Center, Renault Samsung motors, Hyundai motors, Hyundai motors Beijing etc.