

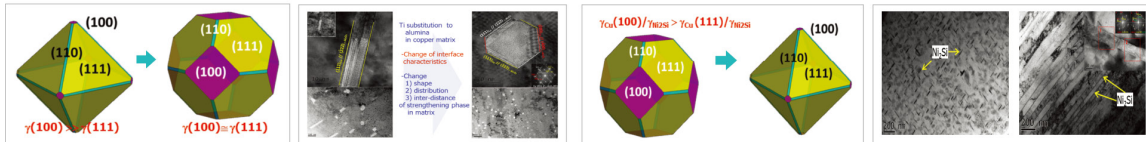
# 동 및 알루미늄합금의 상반특성 동시 향상기술

Simultaneous increasing the trade-off properties in Cu and Al alloy

TRL7

## 기술내용

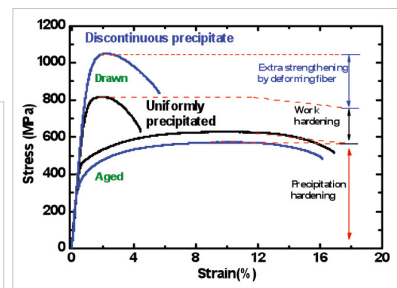
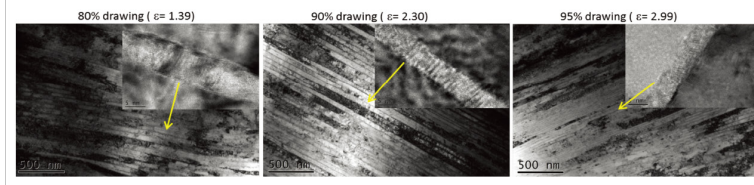
- 강화상과 금속기지상의 계면에너지 및 Kinetics 제어
- Alloy design 및 가공 열처리기술로 나노 구조 구현
- 기존의 개념상 합금에서 동시에 증가시키기 불가능한 강도-전도도, 강도-연신율의 동시 향상



Homogenizing interface energy difference :  $\gamma_i \ll \gamma_j \rightarrow \gamma_i \approx \gamma_j$

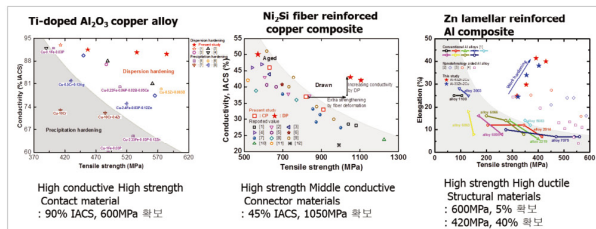
Widening interface energy difference :  $\gamma_i < \gamma_j \rightarrow \gamma_i \ll \gamma_j$

- Alloy design : 석출상 분산상의 계면에너지 변화
- 가공열처리 기술 : 나노 강화상의 배향 및 분포
- 일반 주조 및 가공열처리에 의한 in-situ- nano fiber or lamella r reinforced Cu or Al composite



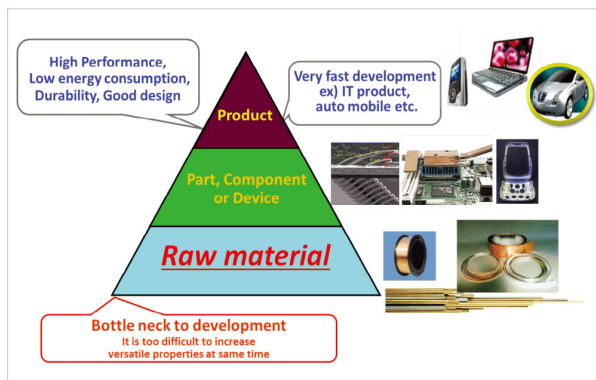
## 우수성

- 기존합금 대비 상반특성 (강도-전도도, 강도-연신율)의 비약적 달성
- [특허] KR10-1760076 석출물을 포함하는 강도와 연신율이 향상된 알루미늄-아연 합금 및 이의 제조방법



## 사업성

- 전력 및 전자 신호 전달용 커넥터 소재의 국내 시장은 3조원 규모 세계시장은 그 10배에 달하는 것으로 추산됨
- 동 및 알루미늄 합금의 상반특성향상은 개발 메이커들이 수십여년 간 추진하던 비전임
- 기존 동 및 알루미늄의 생산공정을 이용할 수 있기 때문에 기술 진입 장벽 및 인프라 구축비용이 저렴

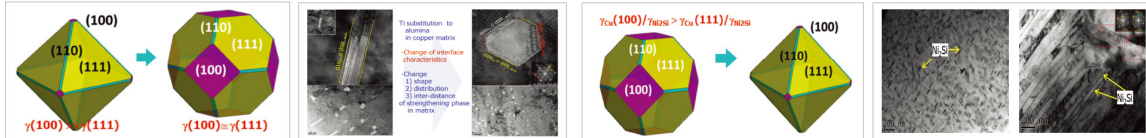


# Simultaneous Increasing of the Trade-off Properties in Cu and Al alloys

TRL7

## Technology Overview

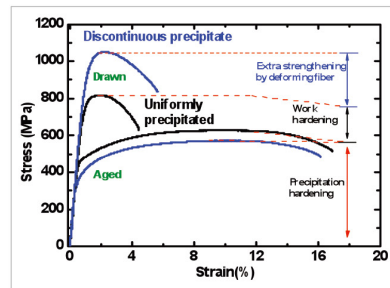
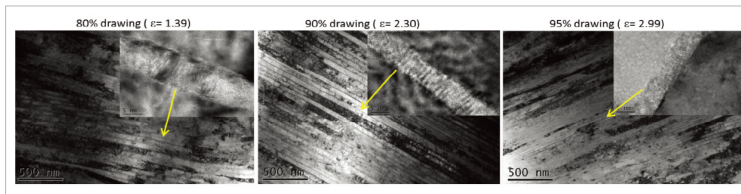
- Control of interface energy and kinetics in reinforced phase and metal matrix phase
- Nano structure created using alloy design and thermomechanical treatment
- Strength vs. conductivity or strength vs. elongation, which could not otherwise be increased with conventional alloys, can now be increased at the same time



Homogenizing interface energy difference :  $\gamma_i \ll \gamma_j \rightarrow \gamma_i = \gamma_j$

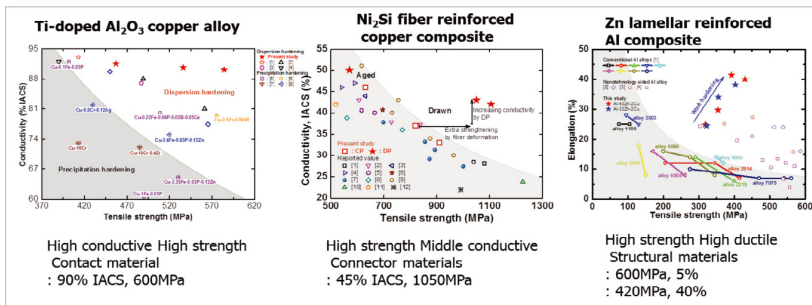
Widening interface energy difference :  $\gamma_i < \gamma_j \rightarrow \gamma_i \ll \gamma_j$

- Alloy design: Changing interface energy in precipitate dispersed phase
- Thermomechanical treatment: Alignment and distribution of nano reinforced phase
- In-situ nano fiber or lamellar-reinforced Cu or Al composite using regular casting and thermomechanical treatment



## Highlights and Strengths

- Improved trade-off properties (strength vs. conductivity, strength vs. elongation)



- [Patent] KR10-1760076 AL-ZN ALLOY COMPRISING PRECIPITATION WITH IMPROVED STRENGTH AND ELONGATION AND METHOD OF MANUFACTURING THE SAME

## Business Cases

- The local market for connector material is worth 3 trillion won. The global market is estimated at ten times the scale.
- Improving the trade-off properties of copper and aluminum have been sought by developers for decades.
- Existing copper and aluminum production facilities can be used, requiring a lower entry barrier and lower cost of building infrastructure.

