

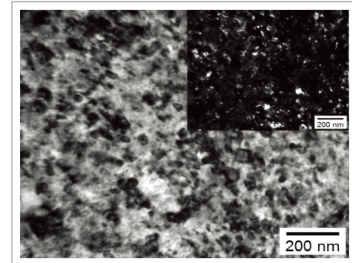
나노결정립 NiTi 형상기억합금 제조 기술

Nano-grained NiTi shape memory alloy

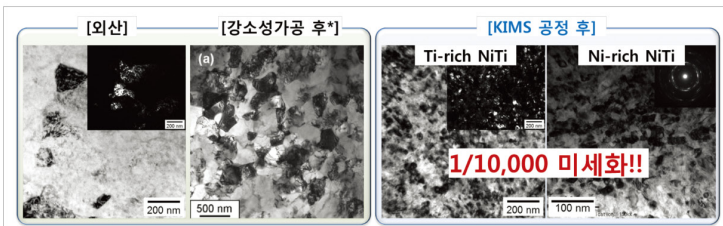
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기술내용

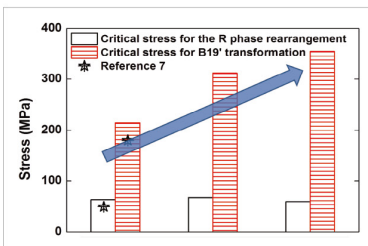
- 형상기억합금의 결정립을 나노미터 수준으로 제어 - Nano-grained NiTi SMA
- 항복강도 및 형상회복능력 동시 상승 - Simultaneous increase in yield strength & recoverable strain
- 형상기억 & 초탄성 영역 에너지 밀도 향상 - Enhanced energy density
- 모든 NiTi 합금에 적용 가능 - Can be applied for any NiTi alloys



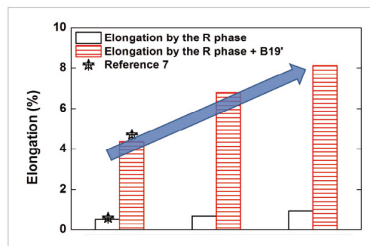
독특한 원자 구조 (Unique Atomic Structure)



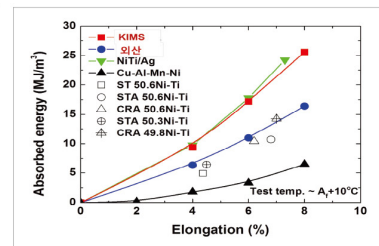
- 외산 : 불균일 미세조직, 큰 결정(>100 μm) 혼재
- 강소성 가공 : 균일 결정립(200~300 nm), 양산성↓
- KIMS : 균일 결정립(20~40 nm), 양산성↑



Enhanced yield strength



Enhanced recoverable elongation



Enhanced energy density

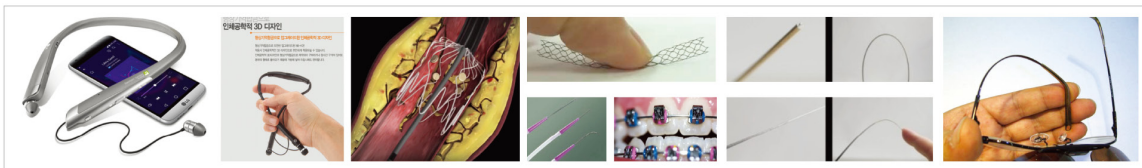
우수성

- 균일한 나노결정립 : 20~40 nm (homogeneous nano-grain structure : 20~40 nm)
- 형상기억 또는 초탄성 강도 향상 : 200 MPa↑ (Enhanced shape memory or superelastic strength : 200 MPa↑)
- 우수한 형상기억 또는 초탄성 회복연신율 : ~8% (Superior shape memory or superelastic elongation : ~8%)
- Ti-rich 또는 Ni-rich NiTi 합금에 모두 적용 가능 (Can be applied for Ti-rich or Ni-rich NiTi alloys)
- 일반 NiTi 생산설비로 양산 가능 (Can be manufactured by using normal NiTi producing facility)

- [특허] KR10-1614409 형상기억합금 및 이의 제조방법

사업성

- 활용분야 : 블루투스 내장 와이어, 심혈관계/비혈관계 스텐트, 가이드 와이어, 치과용 와이어, 안경테, 일상-레저 용품 등
기존 NiTi 제품 대비 차별성(나노결정립 소재) 및 우수성(고내구성, 경량화) 확보
- 사업성 : 의료기기 단일 분야 세계시장 14조원, 별도 추가 장비 없이 기존 NiTi 제조 설비에 적용 가능

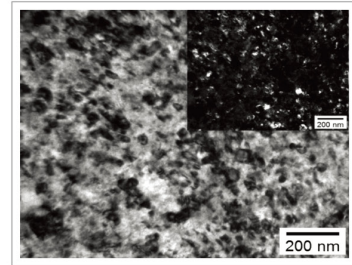


Nano-grained NiTi Shape Memory Alloy

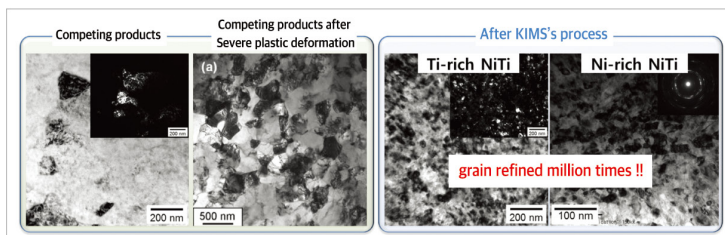
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Technology Overview

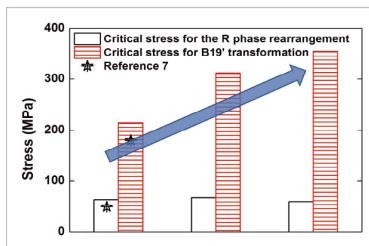
- Nano-grained NiTi shape memory alloy
- Simultaneous increase in yield strength & recoverable strain
- Enhanced energy density during shape memory and superelasticity cycles
- Applicable to any NiTi alloy



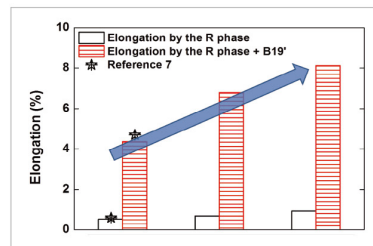
Unique grain structure



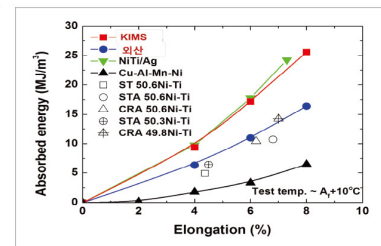
- Competing products: Non-homogeneous microstructure, coarse (>100 μm) grain
- Severe plastic deformation: Homogeneous grain (200-300 nm), but low productivity
- KIMS's product: Homogeneous nano-grain (20-40 nm), and high productivity



Enhanced yield strength



Enhanced recoverable elongation



Enhanced energy density

Highlights and Strengths

- Homogeneous nano-grain structure: 20~40 nm
- Enhanced shape memory or superelastic strength: Over 200 MPa
- Superior shape memory or superelastic elongation: up to 8%
- Applicable to both Ti-rich and Ni-rich NiTi alloys
- Fabricable using normal NiTi producing facility
- [Patent] KR10-1614409 A SHAPE MEMORY ALLOY AND METHOD FOR MANUFACTURING THE SAME

Business Cases

Applications

- Bluetooth embedded wiring, cardiovascular/non-vascular stents, guide wires, dental wiring, optical frames, daily necessities
- Differentiated from existing NiTi products (nano-grain), good mechanical quality (highly durable, light)

Business case

- Global market size of 14 trillion won, applicable to general NiTi fabrication facilities without additional equipment

