

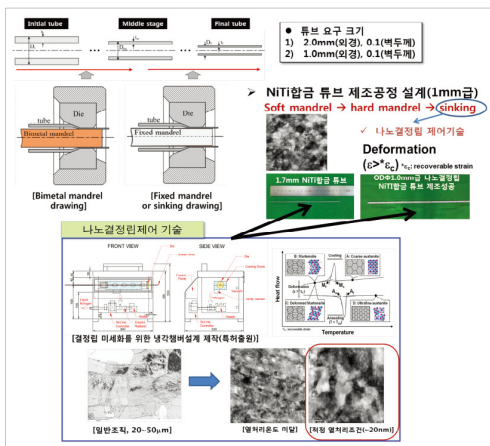
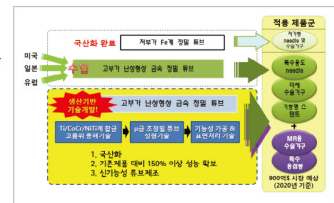
생체의료용 금속소재 튜브 제조 기술

Manufacturing Technology of Metal Tube for Biomedical Applications

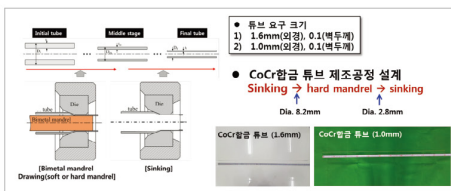
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기술내용

- 다양한 의류기에 사용되는 기존 튜브형 소재의 저피로 강도, 저생산성, 저회수율 문제를 극복하기 위한 고정형 용해기술, 초정밀 튜브성형기술, 제품화 기술 등의 원천 생산기반 기술 개발
- NiTi, CoCr합금 및 Ti계 합금 미세튜브 제조공정 최적화 및 제조기술 확립
 - 내경 1.0mm이하, 벽두께 0.1mm, 표면조도 Ra 10nm이하 달성
- 개발 미세튜브 활용 심혈관용 스텐트 제조후 ISO10993 규정에 의한 생체적합성 시험 만족



나노 결정립 NiTi합금 seamless 미세튜브 제조 공정



균일 결정립 CoCr합금 seamless 미세튜브 제조 공정

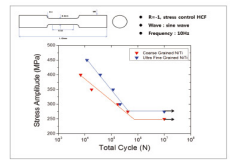


미세튜브 스텐트 가공 및 생체적합성 시험 만족

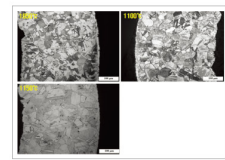
우수성

- 소프트 멘델법 활용 NiTi합금 seamless 미세튜브 제조 공정 확립
- NiTi합금 seamless 미세튜브 제조시 나노결정립 구현기술 개발 (인장, 피로 강도 향상)
- 균일 결정립을 가지는 CoCr합금 seamless 미세튜브 제조 (강도유지, 연신율 향상)
- 개발된 생체의료용 금속소재 미세튜브의 스텐트 가공 양호 확인 및 생체적합성 시험 만족
- 국외 전문제조업체와 차별화된 생체의료용 금속소재 미세튜브 제조 공정 개발

[특허] KR10-2016-0109071 금속관의 인발 방법



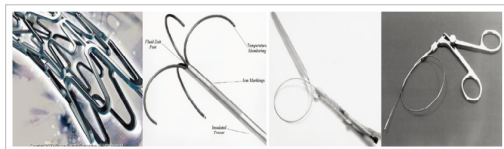
나노결정립 NiTi합금 피로특성향상



CoCr합금 튜브 균일결정립 제어

사업성

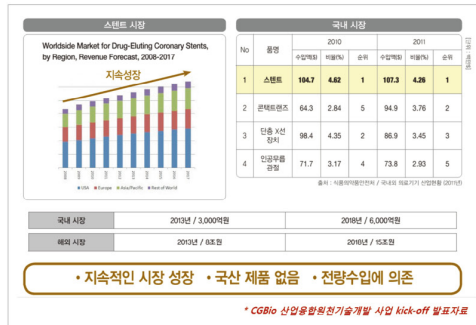
- 생체의료용 금속소재 미세튜브 응용제품 및 시장성



생체의료용 스텐트, 수술기구, 카테터 등 응용

구분	자동자	반도체	디스플레이	광공	의료장비	공정관리/품질	의료장비/응용	의료장비/응용
세계시장 규모	1조원	460억	722억	1조원	3000억	500억	700억	700억
국내 시장 성장률	9%(전국)	10%	13%	5%	8%(평균)	8%	8%	8%
국내시장 세계시장 점유율	6-7%	50% (1회)	48% (1-2회)	4.2%	~ 0	~ 0	~ 0	~ 0

- 국내 금속소재 미세튜브 주요 시장인 스텐트 시장규모 및 전망

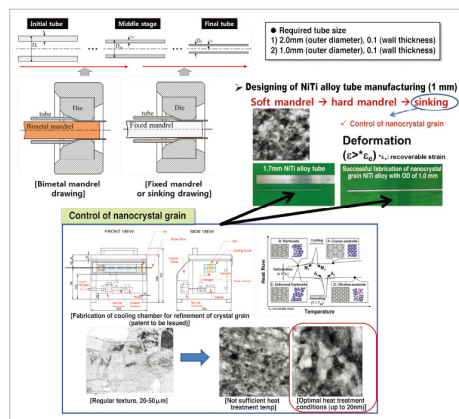
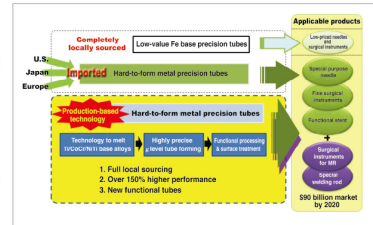


Metal Tubes for Biomedical Applications

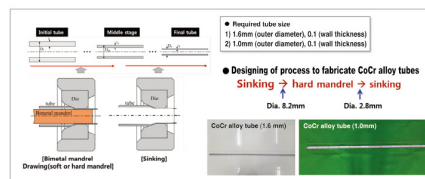
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Technology Overview

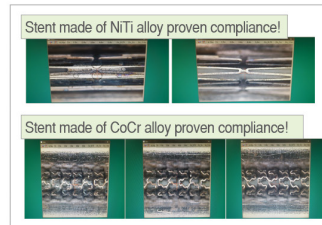
- This technology features highly clean melting, ultra-precise tube forming and commercialization to address the problems of existing tube type materials such as low-fatigue strength, low productivity and low recovery.
- Optimization of micro tubes fabricated from NiTi, CoCr alloy and Ti base alloy
 - Inner diameter of less than 1.0 mm, wall thickness of 0.1 mm, surface illumination of less than Ra 10nm
- Stents made with the developed micro tubes for cardiovascular applications are compliant with biocompatibility regulations under ISO10993.



Process for fabricating seamless micro tubes using nano-crystal grain NiTi alloy



Process for fabricating seamless micro tubes using uniform crystal grain CoCr alloy

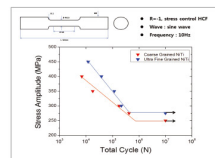


Micro tube stents are compliant with biocompatibility standards.

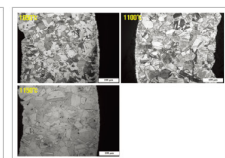


Highlights and Strengths

- Process for fabricating seamless micro tubes using NiTi alloy based on the Soft-Mandrel method
- Implementation of nano-crystal grain during fabrication of seamless NiTi alloy micro tubes
- CoCr-based, seamless micro tubes having uniform crystal grain (same strength, higher elongation)
- Stents made with micro tubes for biomedical purposes are proven to be biocompatible.
- Process is now available for fabricating differentiated micro tubes using metal for biomedical applications in partnership with an international specialist.



[Better fatigue properties of nano-crystal grain, NiTi alloy]

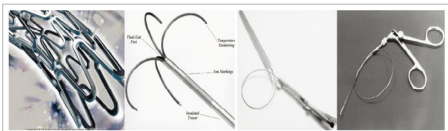


[Control of uniform crystal grain in CoCr alloy tubes]

- [Patent] KR10-2016-0109071 A DRAWING METHOD OF A METAL PIPE

Business Cases

Applications of micro tubes made of metal for biomedical purposes



Stent for biomedical applications, surgical instruments, catheter

Year	Automotive	Semiconductor	Display	Ship	Medical instruments	Implants for treatment of bone diseases	Bio material for cardiovascular vessels
2013	\$1 billion	\$46 billion	\$17.2 billion	\$1 billion	\$50 billion	\$50 billion	\$70 billion
Annual growth rate	5% (mechanical)	10%	10%	5%	8% (average)	18% (average)	18% (average)
Global market share of Korea system	6.7%	0% (Top)	48% (1-2)	4.2%	0	0	0

Stent market in Korea: Today and Forecasted

