

Hong Zhou

Who Am I?

Centre for Engineering and Industrial Design

Waikato Institute of Technology

Professional Biography

- received Master degree from Central South University in 1998, China
- worked as a lecturer at Hohai University from 1998, China
- received PhD from Shanghai Jiao Tong university in 2008, China

Research Interests

- Thermal spray coatings
- Metal forming process
- Materials analysis and characterization and testing.

Research Outputs

Journal Article - Full Article in Journal, Research

1. Hong Zhou, Jun Wang & Bao-de Sun. Microstructure and thermophysical properties of nanostructured thermal barrier coatings. Journal of Coating Technology and Research, 2009, 6(3):383-390.
2. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. Effect of plasma spraying process on microstructure and microhardness of titanium alloy substrate. J. thermal spray technology, 2008, 17(2): 284-288.
3. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. Mechanical properties of nanostructure thermal barrier coatings, Key Engineering Materials, 2008, 368-372 (2): 1280-1283.
4. Bo He, Fei Li, Hong Zhou, Jun Wang & Bao-de Sun. Study of failure of EB-PVD thermal barrier coating upon near- α titanium alloy. Journal of Materials Science, 2008, 43(3): 839-846.
5. Bo He, Fei Li, Hong Zhou, Jun Wang & Bao-de Sun. Thermal failure of thermal barrier coating with thermal sprayed bond coating on titanium alloy. Journal of Coatings Technology Research, 2008, 5(1): 99-106.
6. Hong Zhou, Fei Li, Bo He, Jun Wang & Bao-de Sun. Air plasma sprayed thermal barrier coatings on titanium alloy substrates. Surface and coatings technology, 2007, 201:7360-7367.
7. Hong Zhou, Fei Li, Bo He, Jun Wang & Bao-de Sun. Nanostructured thermal barrier coatings deposited by air plasma spraying, Tran. Nonfer. Metal China, 2007, 17: 389-393.
8. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. Microstructure and thermal barrier effects of thermal barrier coatings. The Chinese Journal of Non-ferrous Metal Society, 2007, 17(10): 1609-1615. (In Chinese)
9. Bo He, Fei Li, Hong Zhou, Jun Wang & Bao-de Sun. Microstructure and thermal cycling behavior of thermal barrier coating on near- α titanium alloy, Journal of Coating Technology and Research, 2007, 4(3): 335-340.
10. Bo He, Fei Li, Hong Zhou, Jun Wang & Bao-de Sun. Preparing and Study of EB-PVD Thermal Barrier Coatings on Titanium Substrates Journal of aeronautical materials, 2007, 27(4):25-30. (In Chinese)
11. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. Characterization of plasma sprayed nanostructured thermal barrier coating. Journal of Beijing university of science and technology, 2006, 28(S1): 274-277. (In Chinese)
12. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. research progresses on materials of thermal barrier coatings. Materials review. 2006, 20 (10): 40-43 (In Chinese)
13. Zhi Liu, Hong Zhou. Research Development of Thermal Barrier Coatings. Journal of Hohai University Changzhou, 2006, 20(3), 9-13. (In Chinese)
14. Z. Zhao, Hong Zhou Xufeng Zhu, Yue Guan. The design and making of Multimedia CAI on metal machining. Journal of Hohai University Changzhou, 2001, 15(3), 39-42. (In Chinese)
15. Z. Zhao, Hong Zhou. Influential factor analyzing on the technologic performance of coating. Journal of Hohai University Changzhou, 2000, 14 (3), 7-12. (In Chinese)
16. Hong Zhou, Dashu Peng. The experimental studies on the wall thickness variations in sinking with double dies. Journal of Light Alloy Fabrication Technology, 1998, vol.26 (No.6), 29-33 (In Chinese)
17. Hong Zhou, Dashu Peng. Upper bound analysis of wall thickness variations during tube sinking process. Journal of Aluminum Fabrication, 1997, vol.20 (No.5), 23-27 (In Chinese)
18. L. Liu, Hong Zhou, Dashu Peng. Study on Aluminum Alloy LF21's resisted stress with fast velocity at room temperature. Journal of Aluminum Fabrication, 1996, vol.19, (No.1), 24-27. (In Chinese).
19. Hong Zhou, J. Wang, B. Sun, et al. Surface laser-glazing of nanostructured thermal barrier coatings (to be submitted)

Research Outputs

Patent in China:

1. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. The device for thermal shock cycling test. Patent Number: 200610024973.4
2. B. He, F. Li, J. Wang, B. Sun, Hong Zhou. Preparation method of γ -TiAl/Ag composite powders. Patent Number: 200710044896.3
3. B. He, F. Li, J. Wang, B. Sun, Hong Zhou. Fabricating of antioxidant ternary coating Ti-Al-Ag. Patent Number: 200710046911.8
4. F. Li, H. Ni, B. He, Hong Zhou, B. Sun. Fabricating of tubular cathode for direct alcohol fuel cells. Patent Number: 200810035206.2
5. F. Li, J. Wang, B. He, Hong Zhou, B. Sun. The spin spraying rotor compounded by graphite and ceramics. Patent Number: 200810037408.0
6. F. Li, B. Luo, B. He, Hong Zhou, B. Sun. The manufacturing technology and mould for larger size ceramic grinding balls. Patent Number: 200810038834.6
7. F. Li, B. Luo, B. He, Hong Zhou, B. Sun. The fabricating method of larger size ceramic grinding balls. Patent Number: 201010203439.6

Research Outputs

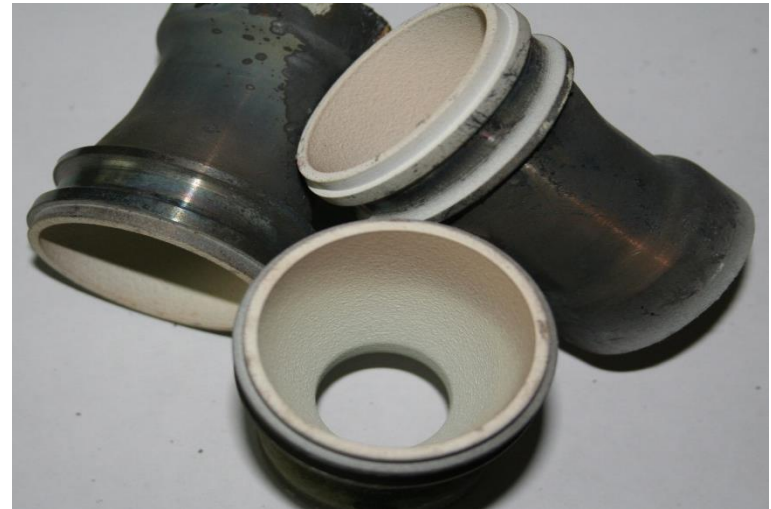
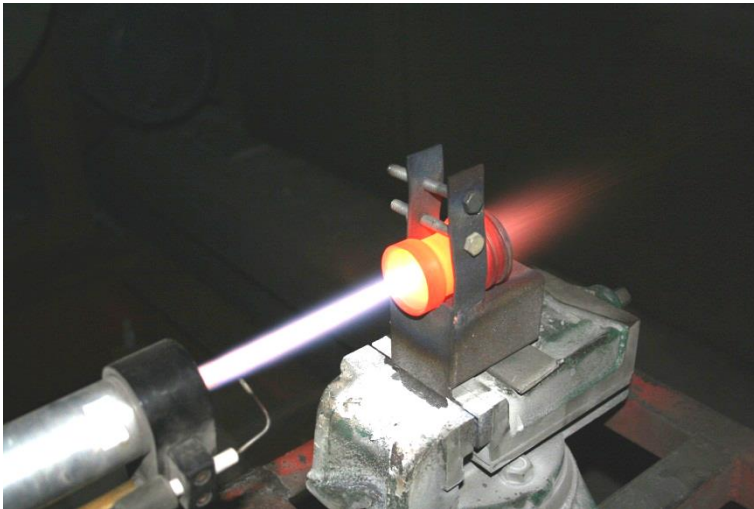
Conferences

1. Hong Zhou, B. Gabbitas, S. Mathews, D. Zhang. Titanium and titanium alloy coatings for corrosion protection. Proceedings of the 12th World Conference on Titanium, Beijing, China, 2011.7:287-491.
2. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. Mechanical properties of nanostructure thermal barrier coatings. The fifth international conference on high performance ceramics, Changsha, China, 2007.7: 1280-1283
3. Hong Zhou, F. Li, B. He, J. Wang, B. Sun. Effect of plasma spraying process on microstructure and microhardness of titanium alloy substrate. The conference proceedings of 2007 International Thermal Spraying Conference, Beijing, China, 2007.5: 983-988
4. Hong Zhou, Fei Li, Bo He, Jun Wang & Bao-de Sun. Investigation on nanostructured thermal barrier coatings deposited by air plasma spraying. The proceedings of 2006 Asian Thermal Spraying Conference. Gyeongju, Korea, 2006: 80-82.
5. Hong Zhou, Fei Li, Bo He, Jun Wang & Bao-de Sun. Characterization of plasma sprayed nanostructured thermal barrier coating. The Proceeding of the 2006 national doctoral academic forum (Branch of materials science and engineering), Beijing China, 2006.10:568-572.

Research Projects participated

- **Thin wall aluminum tube by cold extruding**
- **Wear resistant materials for cutter**
- **Carbon Fiber reinforced composite material**
- **Fabrication and performance of nanostructured thermal barrier coatings on titanium alloy substrate**
- **Surface laser-glazing of thermal sprayed ceramic coatings**
- **Ti coatings**

Fabrication and Performance of Nanostructured Thermal Barrier Coatings on Titanium Alloy Substrate and Surface Laser-glazing of Ceramic Coatings





A systematic study of nanostructured TBCs on titanium alloy has been carried out.

- The characterization of nanostructured TBC,
- the mechanical and thermophysical properties of nanostructured TBCs,
- heat insulating effect,
- residual stress in the coating system after plasma spraying,
- thermal shock behavior and failure mechanism,
- surface laser-glazing.

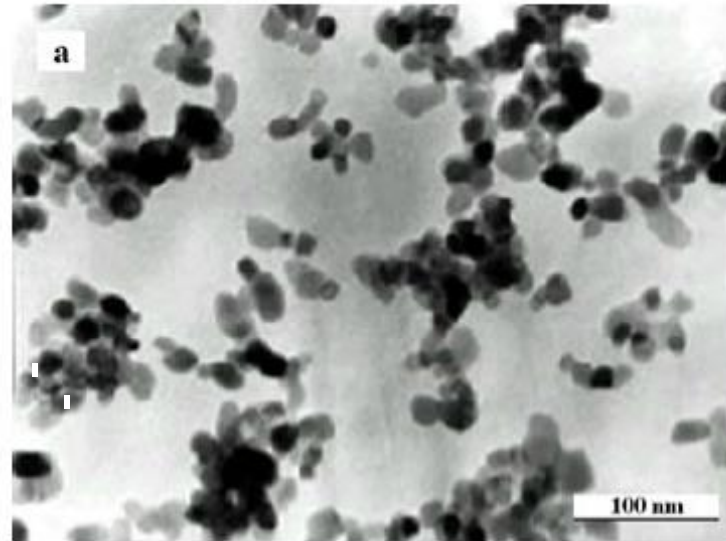
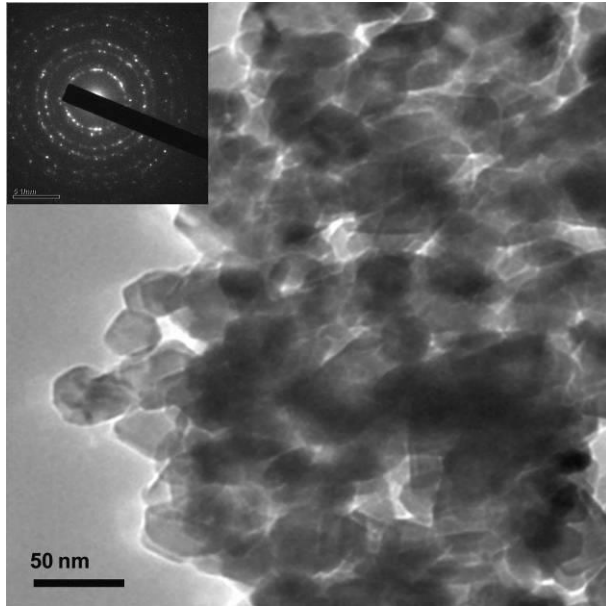
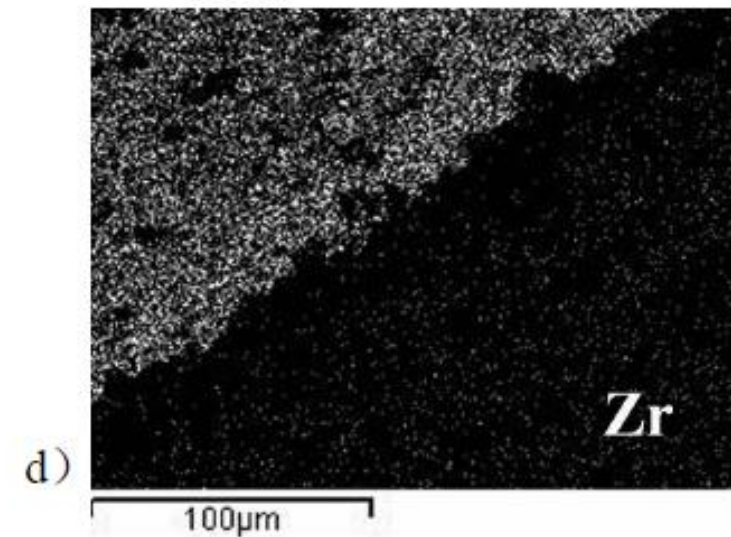
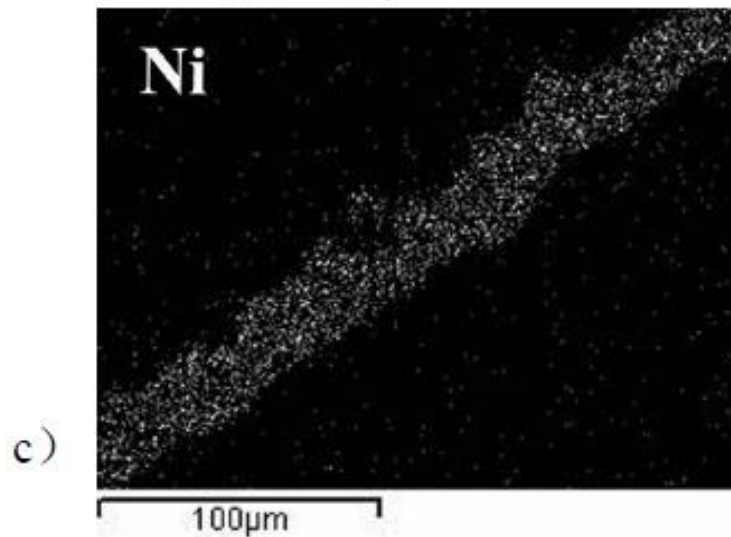
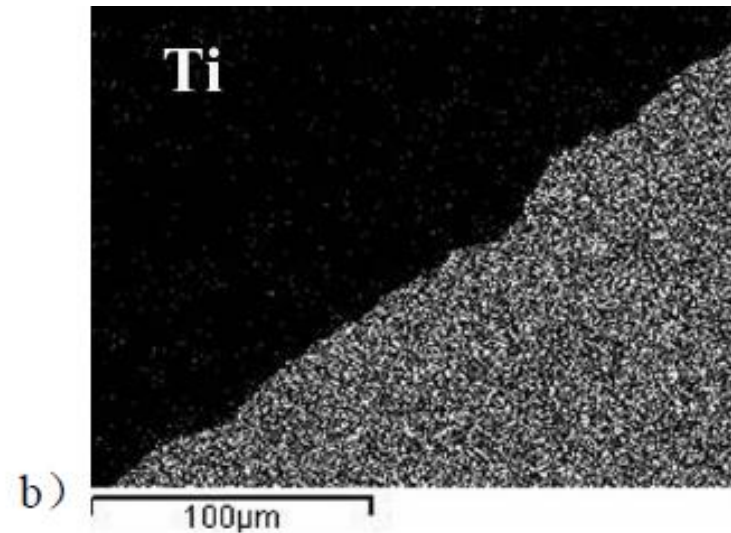
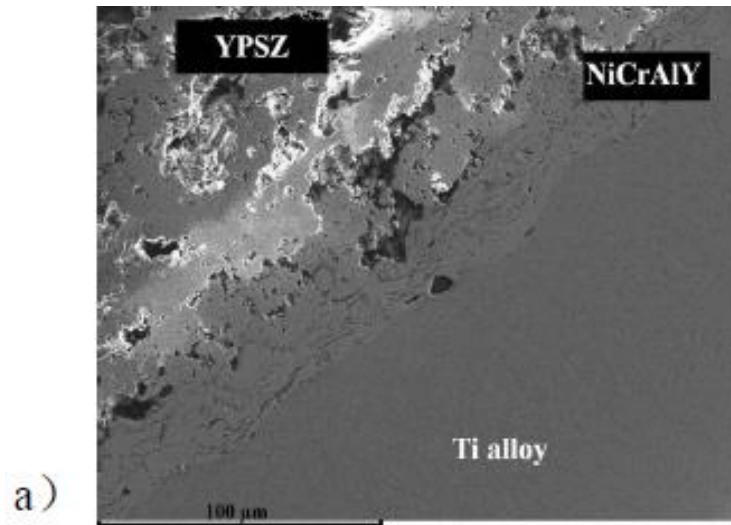


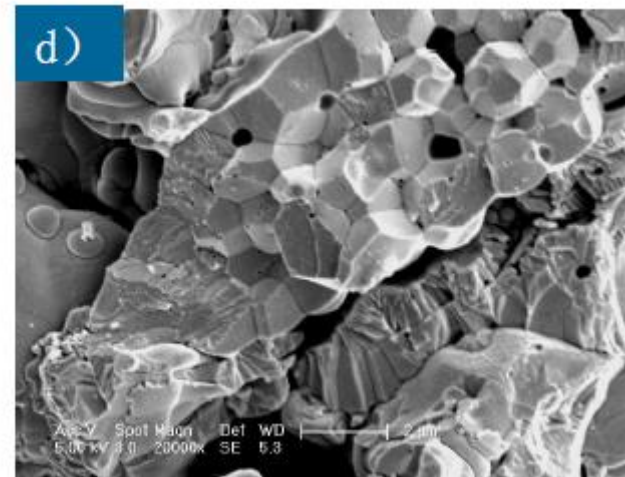
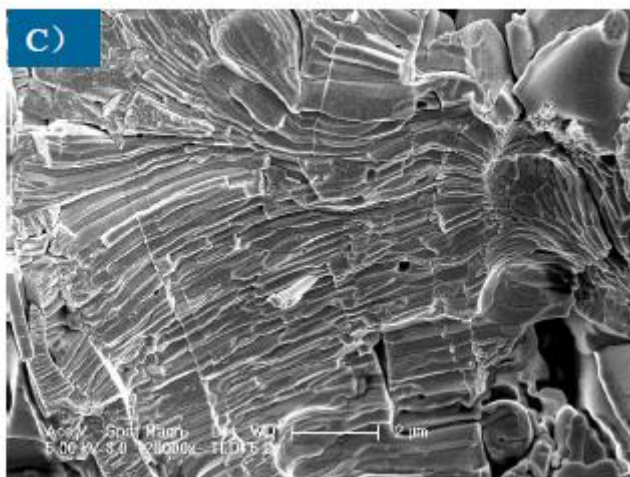
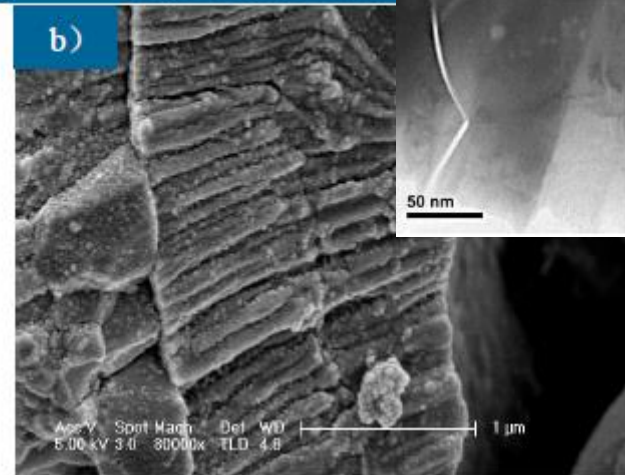
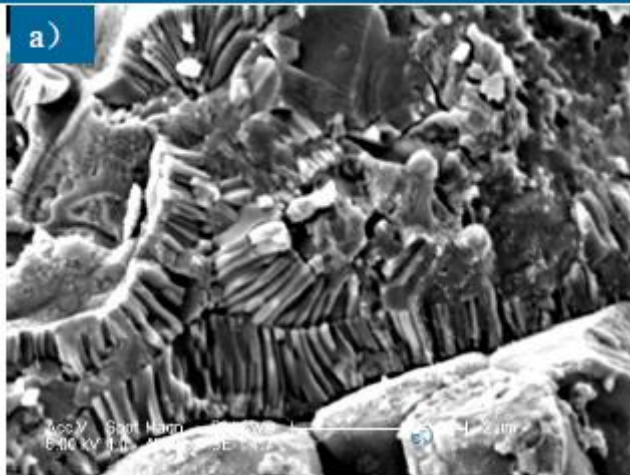
图2-12 氧化锆纳米颗粒形貌TEM照片.

Fig. 2-12 TEM micrograph of the nano-scale YPSZ particles



2-5 钛合金表面热障涂层体系抛光截面组织形貌 (a)以及对应的元素平面分

纳米陶瓷层



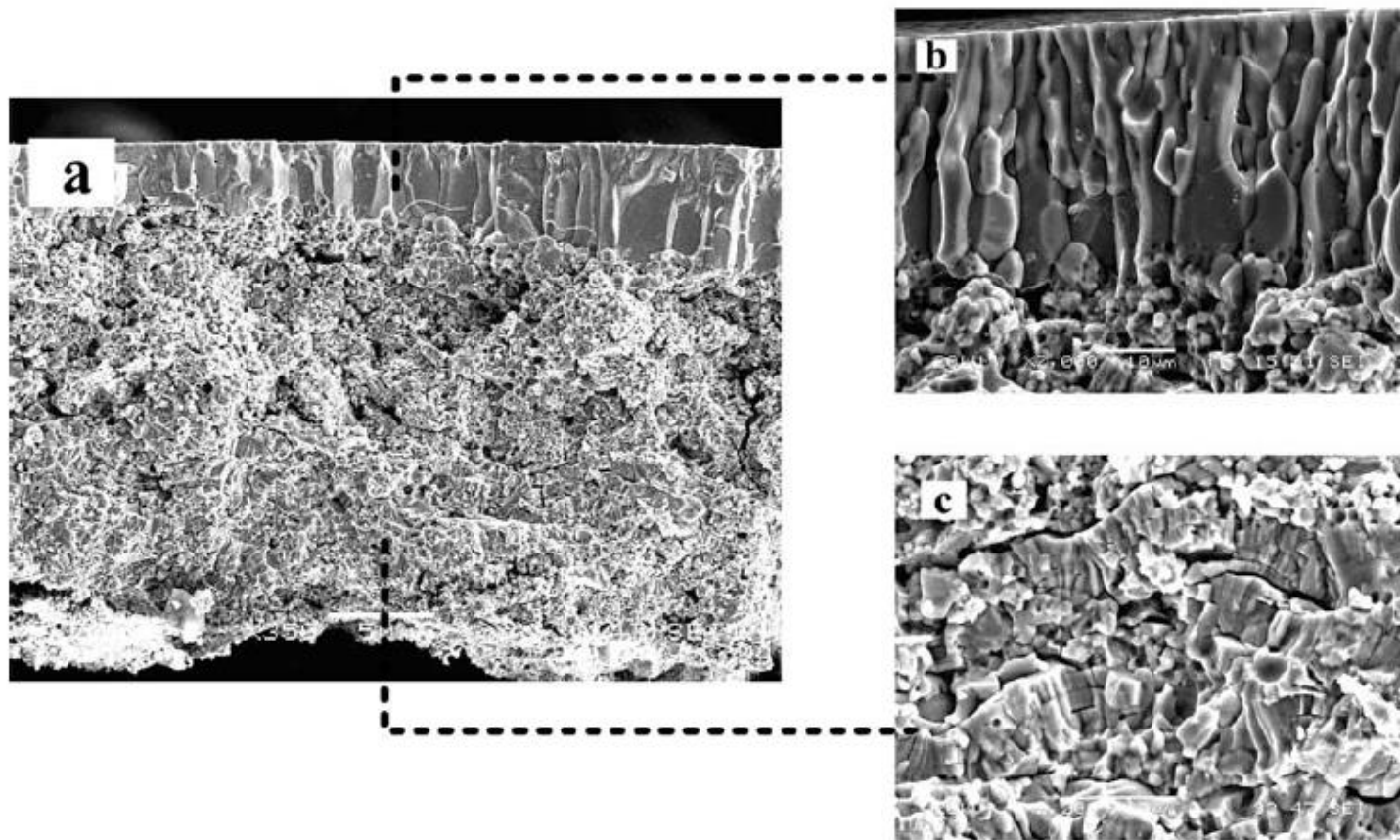


图 6-13 激光重熔试样 (C2) 断裂截面形貌. a) 全貌; b) 柱状晶; c) 喷涂组织

Fig. 6-13 SEM images of the fractured cross-sections for laser-glazed conventional coating, C2. a) panoramic view of the cross section; b) columnar grains in the laser glazed region; c) laminar structure of the as-sprayed coating.

Plasma-sprayed Titanium Coatings

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Outline

1. Significance of Corrosion
2. Introduction of Titanium
3. Titanium Coatings
4. Thermal Sprayed Ti Coatings
 - Characterization
 - Properties

1. Significance of corrosion

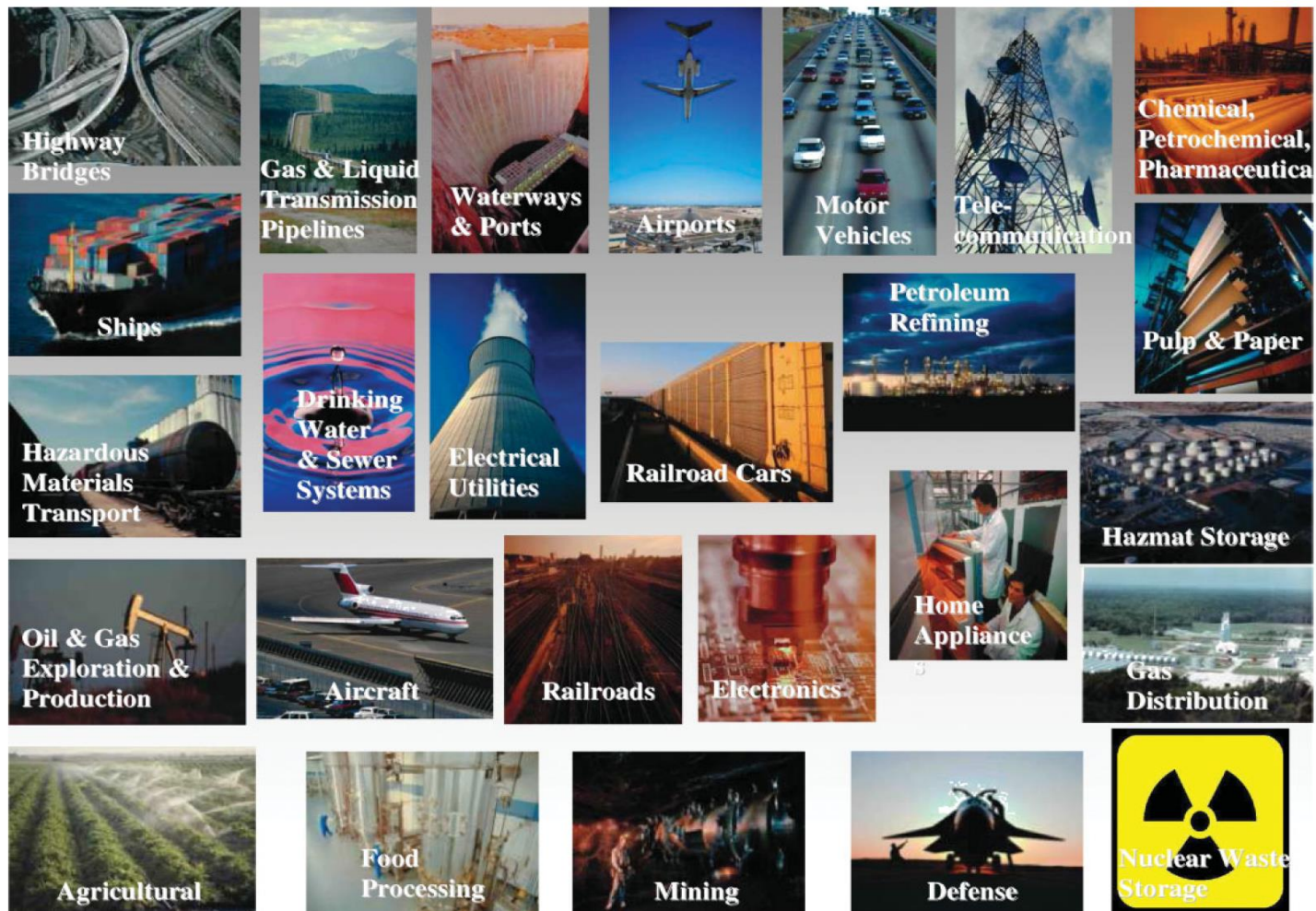


Figure 1. Variety of areas suffering from corrosion problems

Cost of corrosion

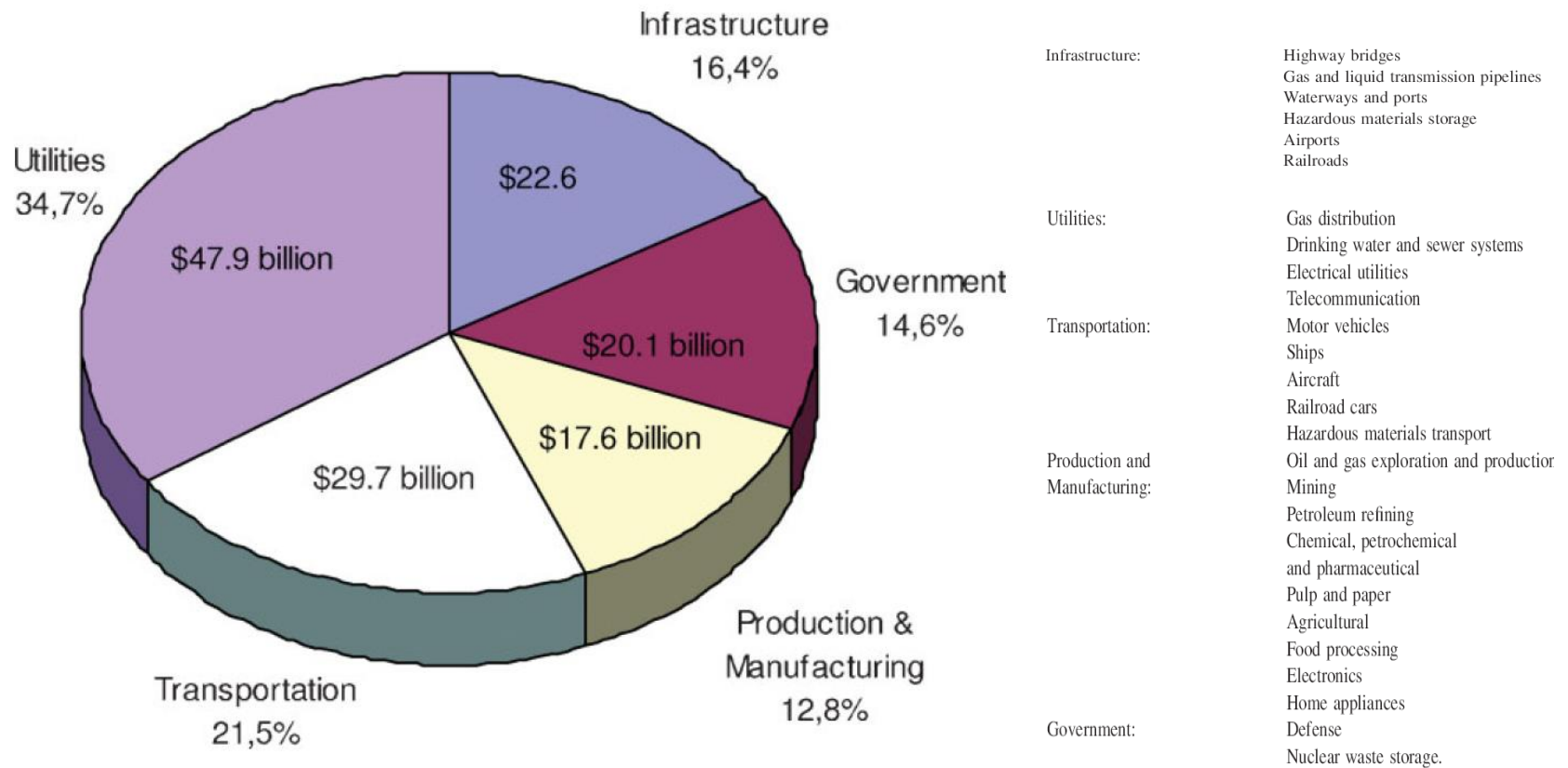


Figure 2. Cost of corrosion in sector categories as analysed in a U.S. study in 1999 [1]

2. Introduction of Titanium

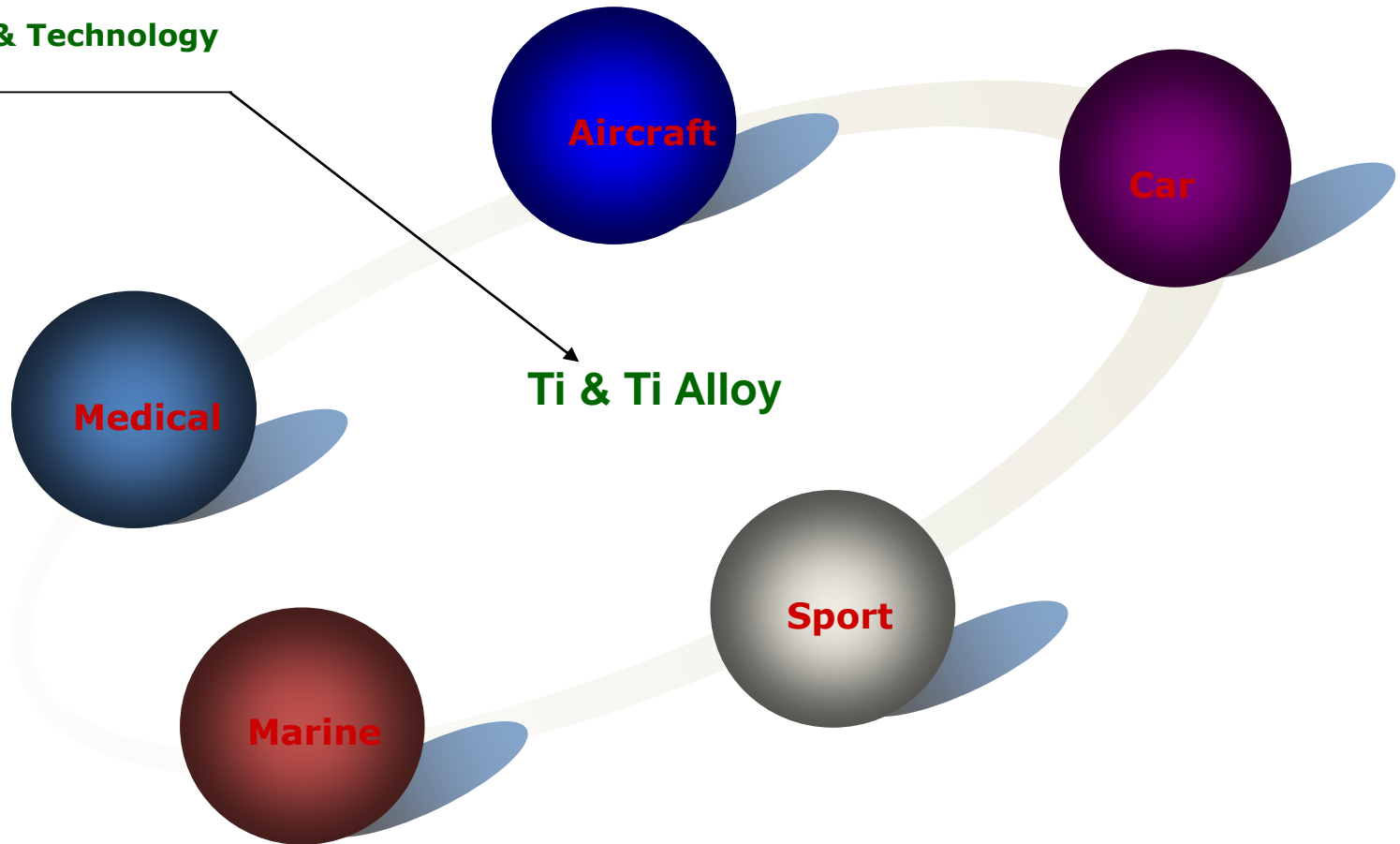
- **Low density**
- **High specific strength**
- **Exceptional biocompatibility**
- **Excellent corrosion resistance**

Especially excellent resistance to Chloride-containing solutions

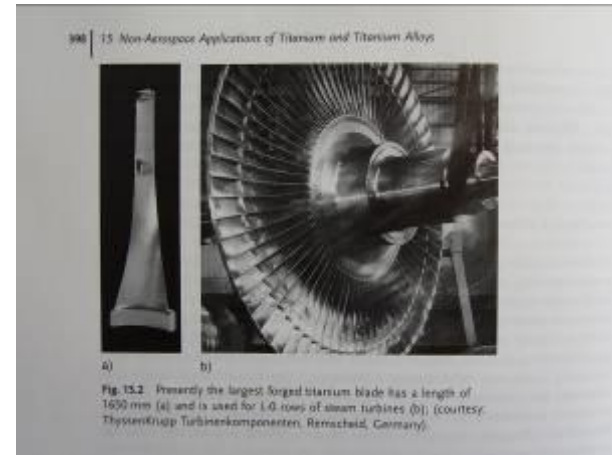
- **Nonmagnetic**

Application of Titanium

Science & Technology



Aircraft and Space Industries



Marine Technology.



Chemical, process and power generation industry with harsh environments.

Food processing industry

Automotive industry

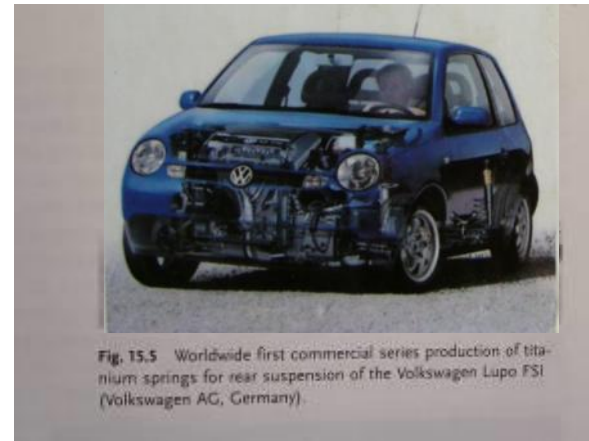


Fig. 15.5 Worldwide first commercial series production of titanium springs for rear suspension of the Volkswagen Lupo FSI (Volkswagen AG, Germany).

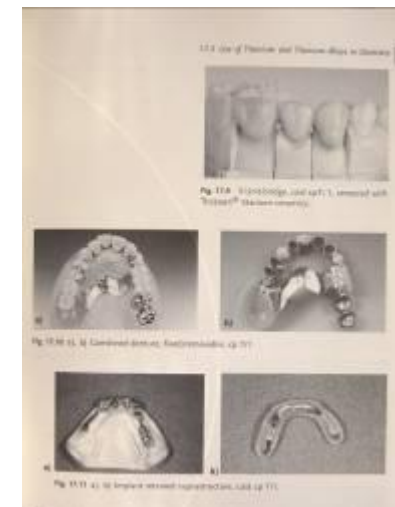
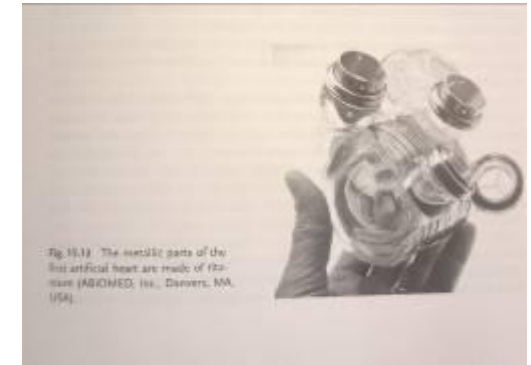
Architecture



Sporting goods and leisure industry



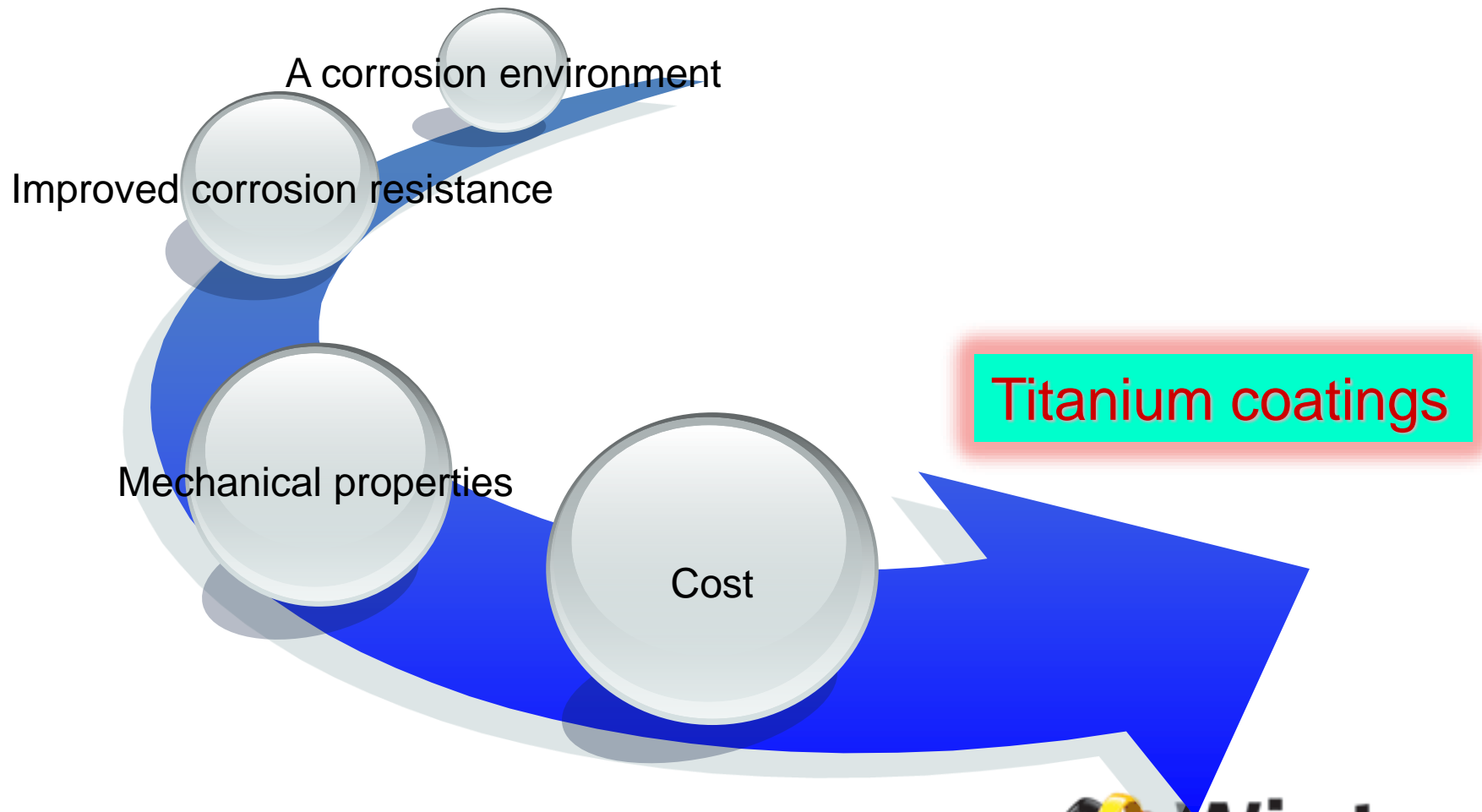
Medical application



However,

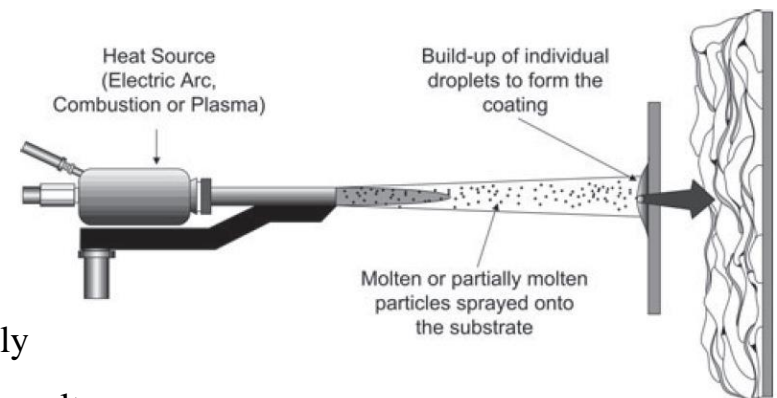
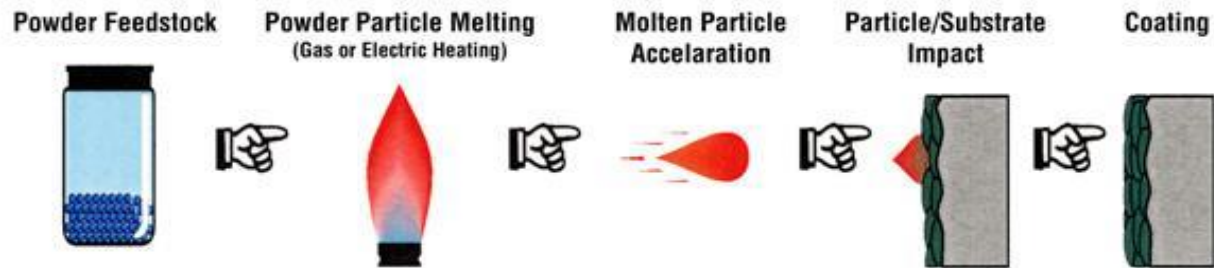
Titanium is not cheap

3. Titanium Coatings



4. Thermal Spray Technology

Thermal Spray Coating Process



Thermal spraying is a generic coating technique whereby finely divided metallic or non-metallic materials in a molten or semi-molten condition are deposited onto a substrate surface to build up a coating.

However,

Titanium and titanium alloys are very **reactive** at high temperatures

A hazardous reaction with gases such as O_2 , H_2 , N_2 , and CO_2 .

5. Research Work

- New shroud designs
- Characterization of powders
- Agglomerating of HDH Powders
- Numerical modeling of Shrouded plasma spraying
- Air plasma spraying Ti coatings
- Corrosion Test