

Innovative Design / Manufacturing Technologies

# Ultra-high Functionalization by Exploring Optimal “ANISOTROPY”, Exhibiting Extremely Superior Function in a Specific Direction

## About this Project

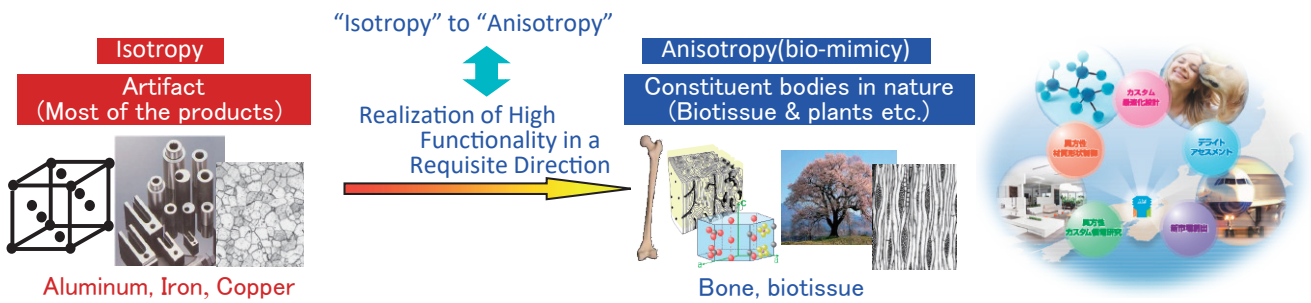
An “anisotropy & customization design/additive manufacturing (AM) R&D center” in Osaka University is established as a technical platform base, and the validation of new streamlined production system is performed with optimal upstream design and additive manufacturing technologies through development of simultaneous controlling method of both “material parameter” and “shape parameter” for high added value based on “Anisotropy” & “Customization”. The R&D and validation of the anisotropic & customized products on home electronics, medical & health care products and aerial and energy components are conducted by driving companies. Through this process, strategies for capture of new markets including university, public research and development institute, large company and small & medium-sized enterprises are developed and commercialization is realized. Finally, a customer-oriented streamlined design & production model is practiced.

● **Problems** of current manufacturing

Product commoditization & poor performance due to mass production of similar product (uniformity)

● **Solutions** proposed in the present Kansai base

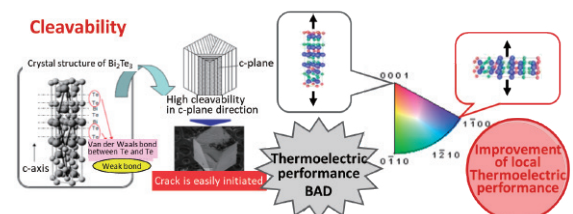
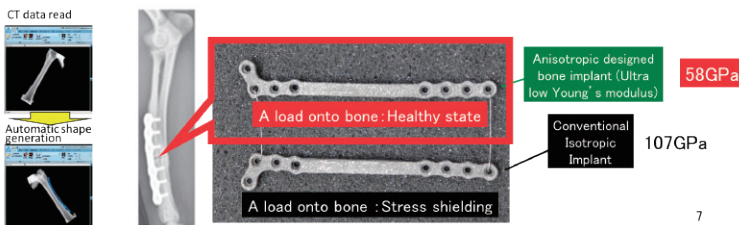
- (1) Simultaneously realizing (A)super upstream delight design + (B) innovative production/manufacturing technologies
- (2) Super upstream design concepts, “Anisotropy” & “Customization”



Capture of market for anisotropic & customized products and validation & dissemination of optimal tool

## Test Uses / Application Examples

- Implant behaves like bone (left figure) : Reduction in elastic modulus by controlling material anisotropy
- Ultrahigh performance cooling device (right figure) : 70% improvement in thermoelectric performance by controlling material anisotropy



Optimal design according to a part & a symptom ⇒ Implant

Development completion. Under consideration of practical use

# Research Achievements

## Development of controlling method for anisotropic custom “material” & “shape”

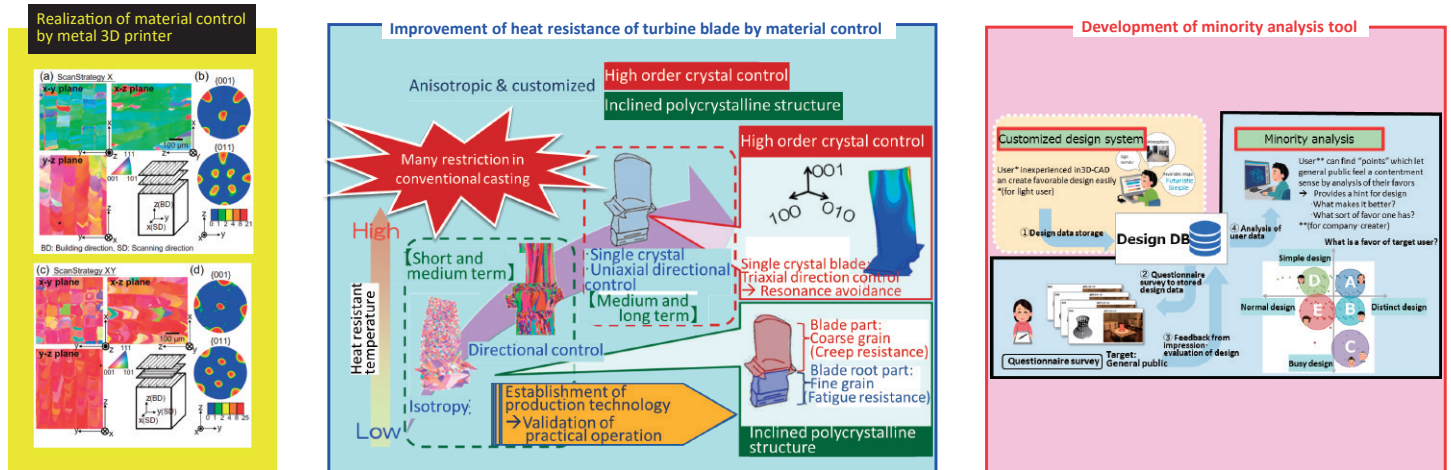
Process and applied developments proceed to **achieve anisotropic control of material & shape**

Process development : **Control of anisotropic custom material & shape by metal 3D printer**

Applied development : Implant, Thermoelectric Device, Turbine blade, Lamp shade

## Development of supporting tool for optimal design

Development of supporting tool for design proceeds in order to **achieve anisotropic control of material & shape**



# Future Outlook

Aiming for spread of anisotropic & customized products and new manufacturing concept based on manufacturing platform validating a customer-oriented streamlined design & production model essential for realizing creation of new markets. Creating sustainable innovation and establishing sustainable system for winning global top by forming the base with a variety of players from industrial-government-academia & users for creating anisotropic & customized products.

*Continued Validation Base : Anisotropy & customization design / additive manufacturing (AM) R&D center in Osaka University / Osaka Research Institute of Industrial Science and Technology / Advanced veterinary consortium*

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 Osaka Research Institute of Industrial Science and Technology

**Panasonic**



Research Theme : Establishment and Validation of the base for 3D Design & Additive Manufacturing Standing on the Concept “Anisotropy” & “Customization”

Members : Osaka University, Panasonic Corporation, Osaka Research Institute of Industrial Science and Technology, Kyoto University, The University of Tokyo, Osaka Prefecture University, Teijin, Nakashima Medical Co., Ltd., Kitasuma Animal Hospital, Kawasaki Heavy Industries, Ltd.

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