

Adsorption behavior of serum proteins on the surface of Hydroxyapatite ceramics with preferred orientation to a -plane

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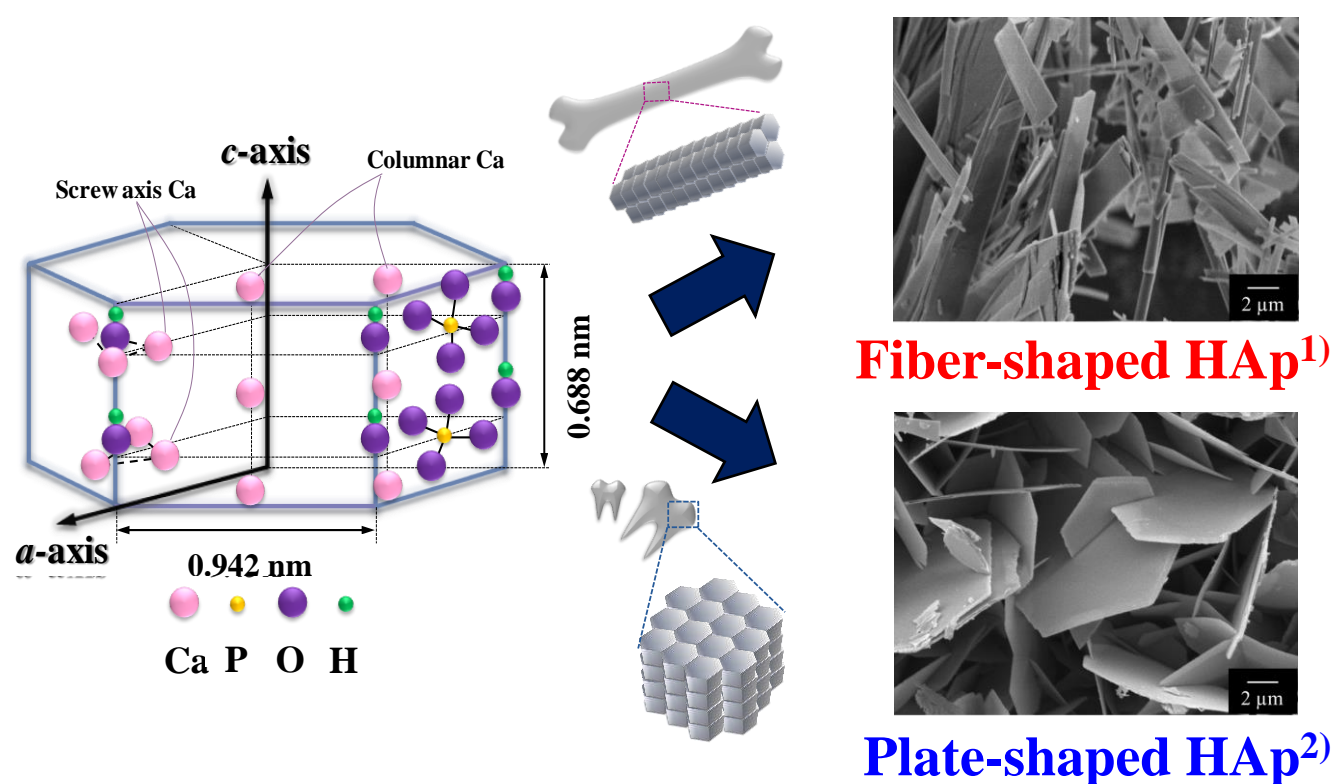


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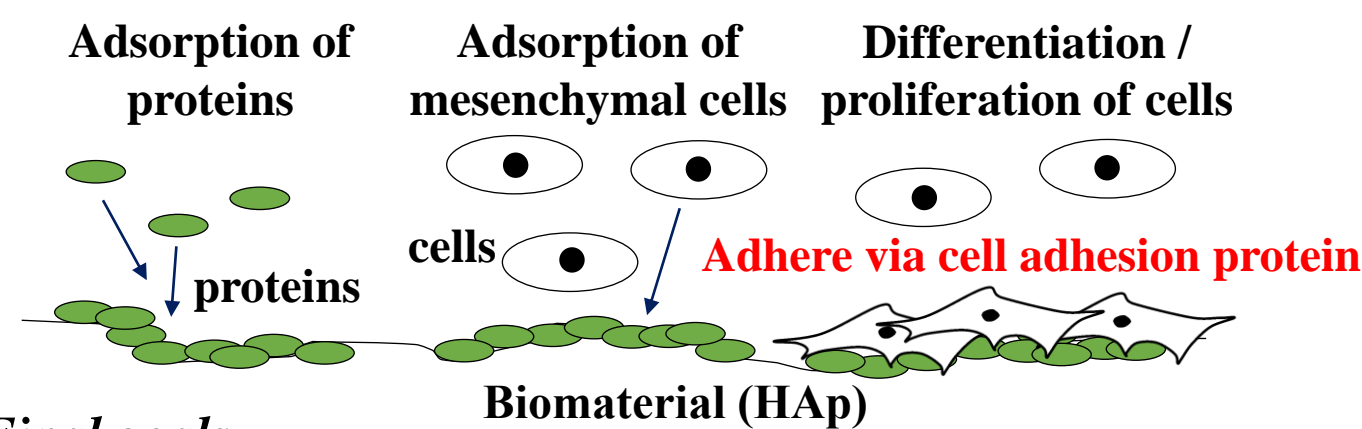
Introduction.

Hydroxyapatite $Ca_{10}(PO_4)_6(OH)_2$; HAp



1) M. Aizawa et al., *Biomaterials*, 26, 3427-3433 (2005).
2) Z. Zhuang et al., *Mater. Sci. Eng. C*, 33, 2534-2540 (2013).

In vivo initial reaction after biomaterial implantation



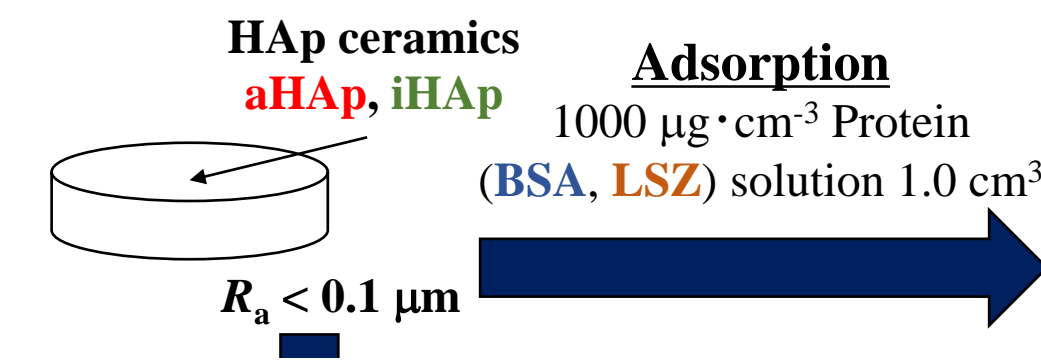
Final goals

- ① Understanding of *in vivo* reactions at the interface between materials and cells.
- ② Elucidation of the relationship between anisotropy and cellular response of living bone.

In this study

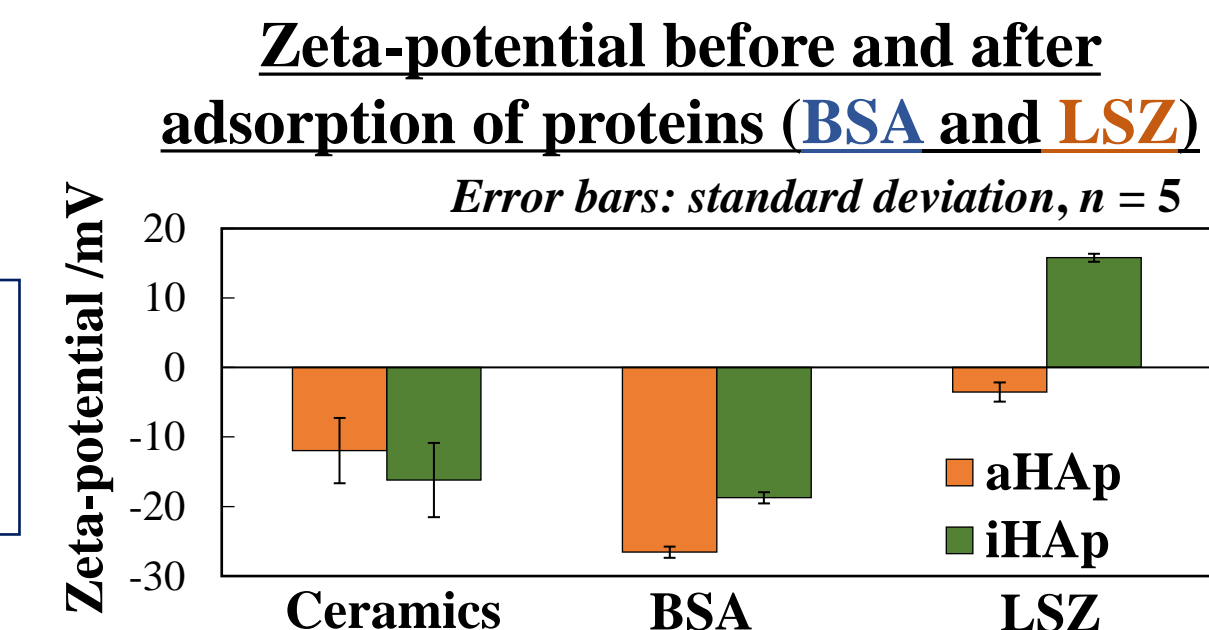
Using HAp ceramics with anisotropic structure as models, we examine the electrostatic interaction between HAp and protein.

Protein adsorption.

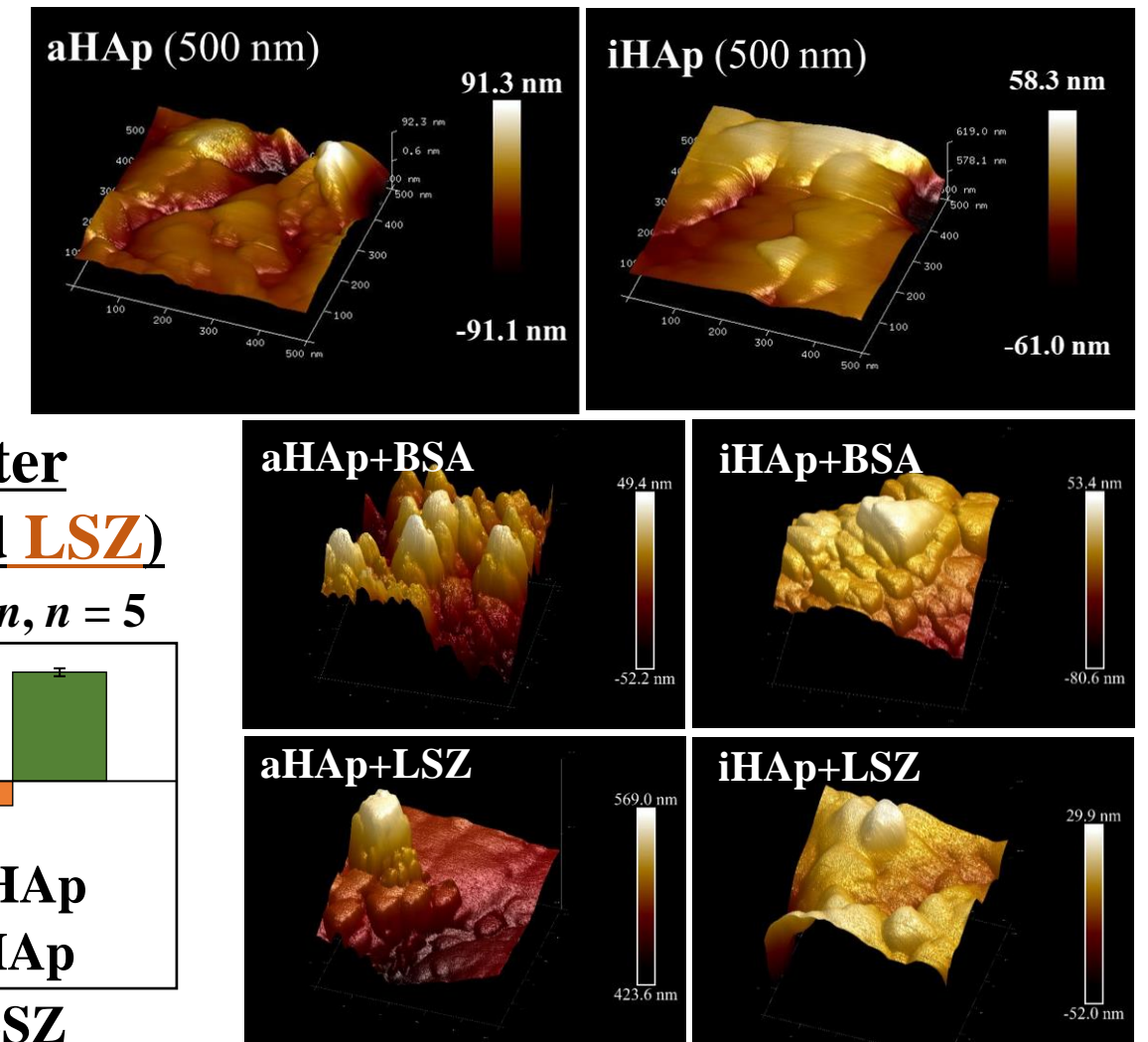


Surface analysis
• Zeta-potential
• Atomic force microscopy (AFM)

- Quantitative analysis
- Two-dimensional electrophoresis

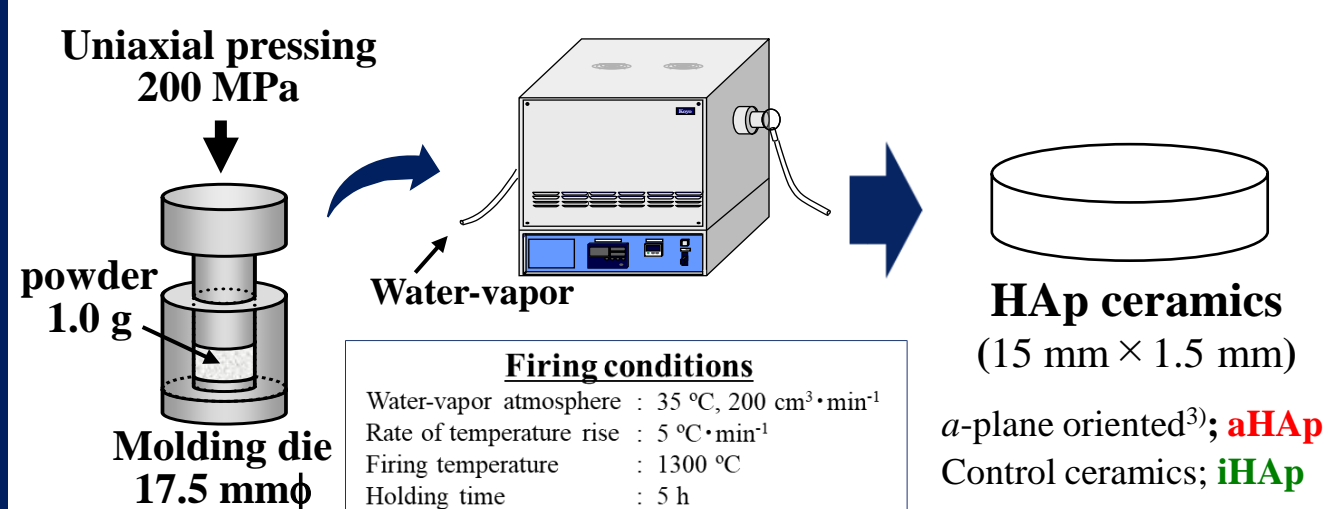
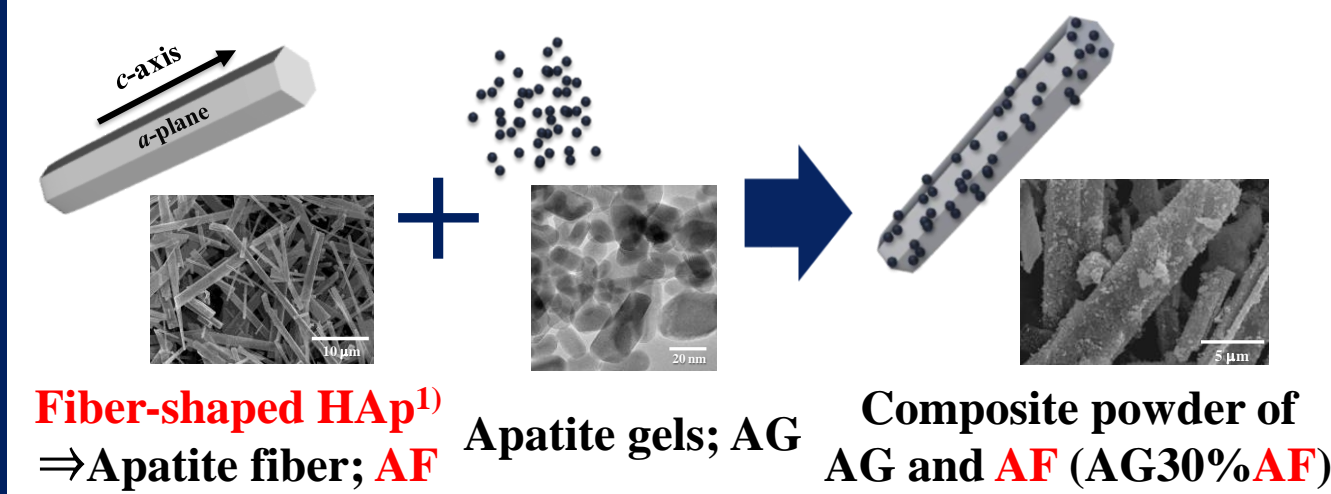


Observation of surface microstructure



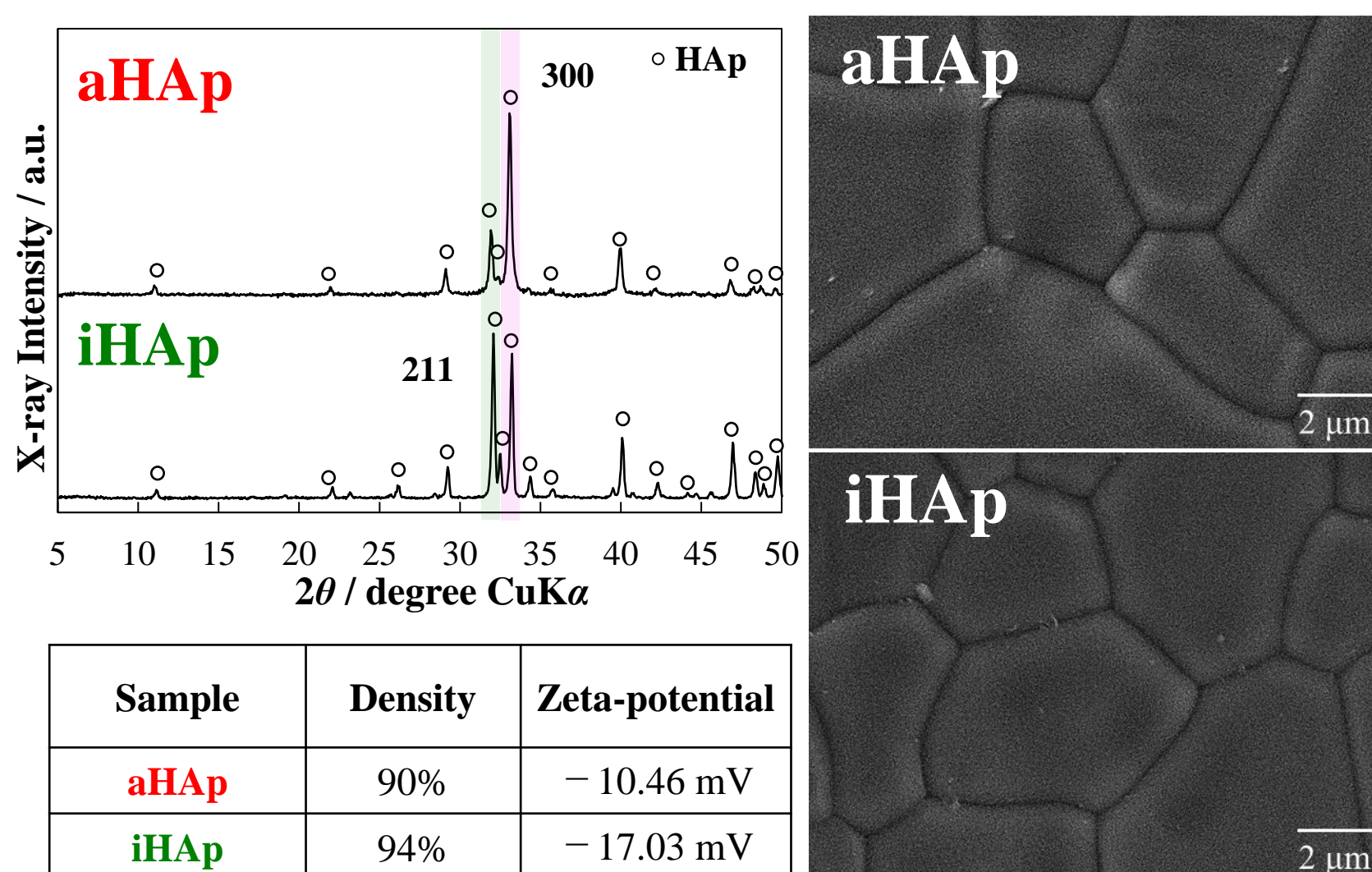
Characterization of HAp ceramics.

Fabrication of Hydroxyapatite ceramics



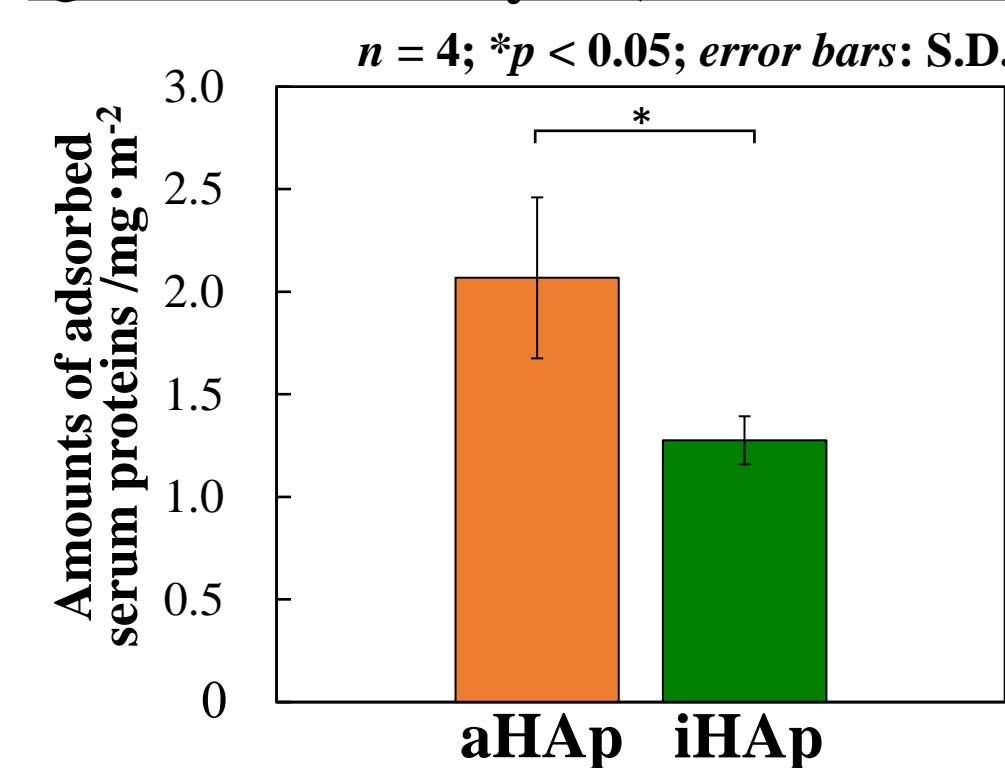
1) M. Aizawa et al., *Biomaterials*, 26, 3427-3433 (2005).
3) Z. Zhuang et al., *Acta Biomaterialia*, 9, 6732-6740 (2013).

Characterization of Hydroxyapatite ceramics

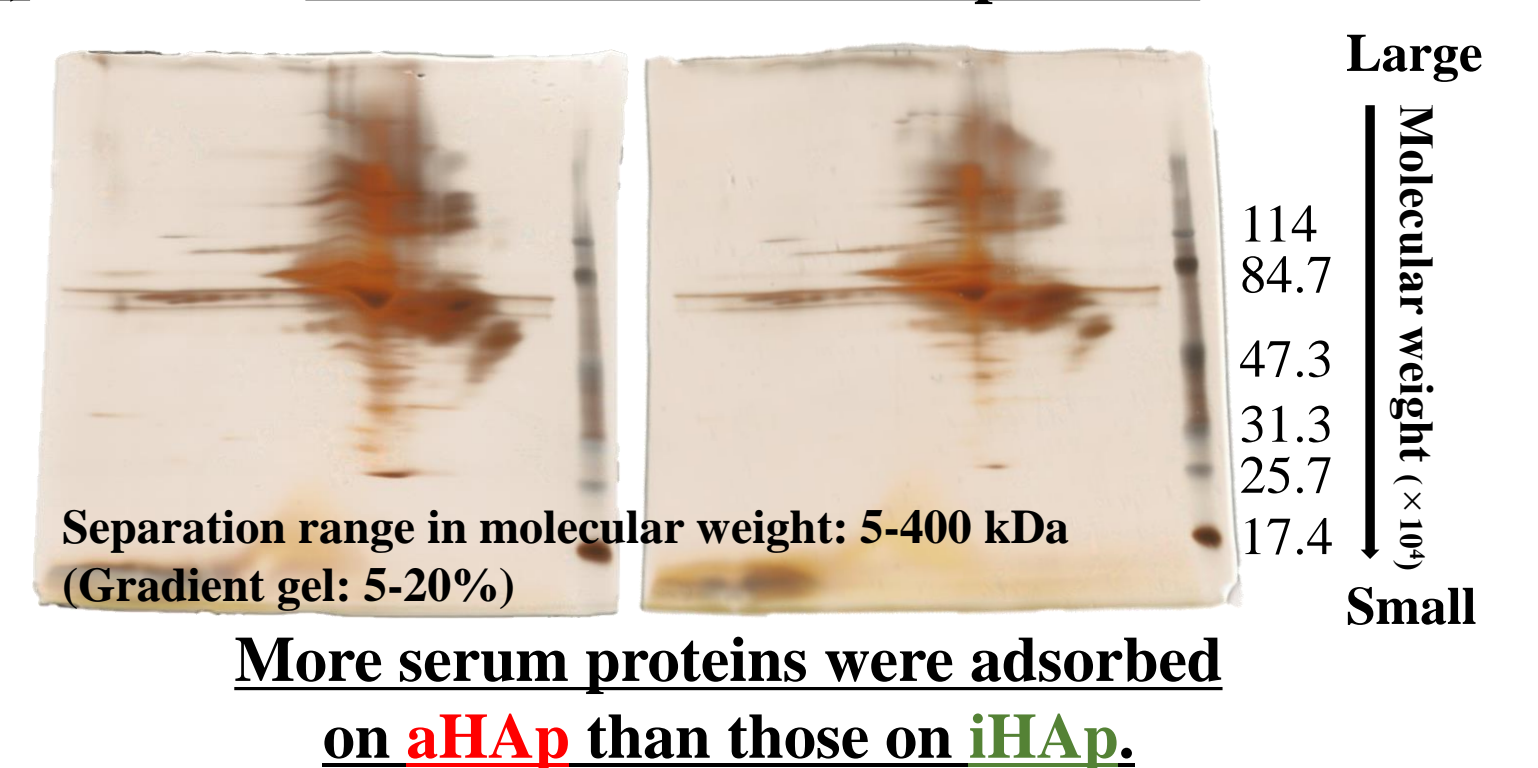


aHAp: preferred orientation to a -plane

Quantitative analysis (Bradford method)



Two-dimensional electrophoresis



More serum proteins were adsorbed on aHAp than those on iHAp.

Conclusions.

- Electrostatic interaction works between HAp and protein.
- The difference in the crystal plane of HAp affects the protein adsorption.

This study is useful for understanding of the relationship between anisotropy of living bones and cellular responses.