



Beitrag ID: 153 Beitragskennung: 87

Typ: Poster

Machine Learning for the Automated Selection and Reconstruction of Multi-Modal Nanotomography Data of Bone-Implant Interfaces

Synchrotron radiation-based imaging and structural characterization provides unique opportunities to study hierarchical materials systems, such as bone. Correlative 3D imaging enables linking cellular connectivity and bone mineralization via transmission X-ray microscopy, X-ray diffraction and X-ray fluorescence. Generated data is terabyte-scale. We have acquired multi-modal datasets of bone from the bone-to-implant interface at the Hereon beamlines at PETRA III, DESY to study the impact of different implant types on bone mineralization. We employ machine learning methodologies from computer vision, such as segmentation and object detection, in combination with clustering to enhance data evaluation and future data acquisition.

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Keywords

Machine Learning

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