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|  | **NanoXCT****Compact X-ray computed tomography system for nondestructive characterization of nano materials**Christoph Heinzl* Description
* Open topics
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* What we expect…
* Further information

Nano characterization examples: SEM image of STMicroelectronics gyroscope for iPhone4 (top); “Nanobama” SEM image, the face is made of approximately 150 million carbon nanotubes (bottom) (images are courtesy of Chipworks and Nanobama) |



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| **Description** |
| Within the past decades, advances in miniaturization from micro to nano-scale have had dramatic impacts on our lives. Consumer electronics, which once occupied large volumes, now fit in the palm of a hand. But nanotechnology does not only improve in electronics. Also material sciences, chemical engineering, or biology are strongly profiting from nanotechnology. The tremendous achievements in all of these areas would not have been possible without the material analytics in behind. Material analytics for nano-scale characterization currently covers destructive methods, surface inspection methods, or 2D methods.To date it is not possible to get a comprehensive representation of a specimen including internal and external 3D-structure analysis as well as a chemical analysis without destroying the probe. In this respect, nano-scale material analytics is currently on the edge of a new era, which is targeted in the NanoXCT project. The project addresses the limitations of conventional techniques using 3D X-ray computed tomography, which allows for a non-destructive and fully three dimensional characterizations of specimens. In order to facilitate X-ray computed tomography at the nanometer scale, NanoXCT comprises a novel concept of an ultra-bright X-ray source in combination with a high precision focusing and emission system. Furthermore, a highly sensitive, photon counting wide field of view small pitch X-ray detector concept will be included. The concept is perfected by a high precision manipulation system, which allows for alternative scanning geometries as helical CT, and a suitable software environment for data processing and analysis. NanoXCT links the activities of 11 partners from 8 European countries including 5 SMEs to design, develop and implement a compact X-ray computed tomography system for non-destructive characterization of nano materials and components. |

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| **Open topics** |
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| NanoXCT algorithms and methods: (a) Design and implementation of specific NanoXCT reconstruction algorithms to address issues such as phase contrast, artifact reduction, novel image acquisition geometries (e.g., helical CT, region of interest CT, limited angle CT) (b) Design and implementation of specific algorithms to address qualitative and quantitative evaluation of multimodal data at the nano scale for structural and chemical characterization. This includes image enhancement, analysis concerning structural features, e.g. orientation or alignment, and chemical decomposition in combination with meaningful visualizations of the resultsIf you are interested, just contact us and we will find an interesting topic for you. |

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| **What we offer…** |
| * professional supervision and environment
* strong cooperation with industrial and research partners
* interesting topics, applied research on real world problems
* financial refund
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| **What we expect…** |
| * interest and some knowledge the topics computer graphics, visualization, visual analytics, or image processing
* programming experience (C++, C# and/or Java, ....)
* to be open for new challenges.
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| **Further information** |
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