



北京大学

# 王仁力学讲座



## Multiscale modelling and topological optimization of flexoelectric metastructures

报告人: Prof. Dr. Xiaoying Zhuang (庄晓莹)  
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时 间: 7月26日 (周三) 上午10:00—11:00

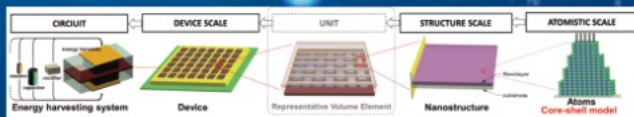
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### 报告人简介:

Dr. Xiaoying Zhuang's key research area is computational materials design for nano composites, metamaterials and nanostructures as well as computational methods for multiphysics and multiscale modelling. She was awarded with the Sofja-Kovalevskaja Prize from Alexander von Humboldt Foundation focusing on the modelling and optimization of polymeric nanocomposite. She is the recipient of Heinz-Maier-Leibnitz Prize for young scientists and was granted with Heisenberg-Professor. Her ongoing ERC Grant is devoted to the optimization and multiscale modelling of piezoelectric and flexoelectric nano structures.

### 内容简介:

Flexoelectricity is the generation of electric polarization under mechanical gradient or mechanical deformation subjected to an electric gradient (converse-flexo). Flexoelectricity is a more general phenomenon than the linear change in polarization due to stress, the piezoelectric effect. In contrast to piezoelectricity, flexoelectricity exists in wider range of centrosymmetric materials especially nontoxic material useful for biomedical application. Flexoelectricity grows dominantly in energy density when scale reduces to submicro or nano, meaning the promise of enabling self-powered nano device such as body implant and small-scale wireless sensor. In this talk, I will present the multiscale characterization of flexoelectric materials and design of flexoelectric including nonlinear topological optimization for single/multi-phase materials, machine learning based nanoscale characterization of 2D flexoelectric materials, and atomistic to continuum dynamic flexoelectric modelling. Phononic metamaterials for enhancing the flexoelectricity is being utilized and integrated in the design to outperform the current design of nano energy harvesters. Interesting phenomenon of utilizing topological insulators and metaplates of phononic structures will be shown that can enhance the performance of nano energy harvester.



Multiscale modeling of flexoelectric nano structures

### 王仁:

著名力学家、地球动力学家和教育家，中国科学院院士。他为我国的塑性力学和地球构造动力学的发展做出了奠基性和开拓性的贡献。在塑性动力学和地质构造应力场分析等方面的研究成果在国内外均有较大影响，是中国将力学与地质学和固体地球物理学相结合的先驱者。

主办单位: 北京大学工学院力学与工程科学系

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