

Science Cases with Energy Recovery Linac

Shin-ichi Adachi
Photon Factory, KEK

Realizing sustainable society and better use of the world's natural resources have become crucial issues to date. In order to ensure a safe and secure future, deeper understanding of the basic science underpinning energy technologies is urgently needed.

Energy Recovery Linac (ERL) is a next-generation light source to open a new era in materials and life sciences. The Institute of Materials Structure Science, KEK, is currently proposing to construct a 3-GeV ERL in the KEK campus. Cinematic imaging of materials dynamics on the nanoscale, determination of the structure of heterogeneous systems, and development of non-linear X-ray spectroscopies are expected to be realized with this high repetition rate, high brilliance, high spatial coherence X-ray source. These unique capabilities will lead to a new understanding of how electronic and nuclear motions in molecules and solids are coupled, and how functional systems perform and evolve in situ. ERL will dramatically impact a wide range of applications, and particularly will be a revolutionary observational tool that will bridge the critical gaps in our understanding of energy science. The science cases of the ERL project will be presented.