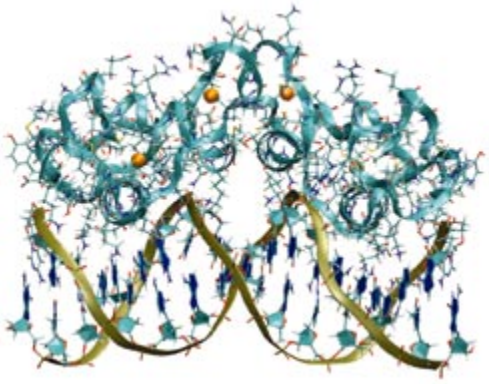
Development of Molecular Orbital Calculation System for a Large System on Grid

In order to study electronic state of protein-biomolecular system, we started to develop a Molecular Orbital(MO) calculation system on Grid environment.

This system realizes MO calculation for large scale biosystem such as Estrogen receptor and DNA. (Figure 1) Analysis of electronic state gives a lot of basic information to not only drugs and materials design but also guidelines for medical treatment. For the Estrogen dimer and DNA system, the role of the dimer and waters became clear. Dimer fixs coordinate position and direction. Waters shield Coulomb force and play as glue connecting DNA and Estrogen dimer.

Grid technology is indispensable to large scale MO calculation.

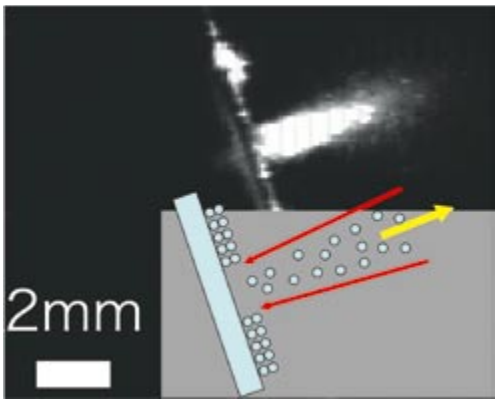


Estrogen recepter dimer binding to DNA

Unpei NAGASHIMA
Grid Technology Research Cetnter
e-mail: u.nagashima@aist.go.jp
AIST Today Vol. 4, No.7 (2004) 16

Maximization of the EUV Radiation Efficiency from a Laser-Produced Plasma for EUV Lithography

Increase of the conversion efficiency of radiation at 13-14nm is the most important issue for making EUVL affordable. An analytical formula for maximizing the radiation efficiency from a laser-produced plasma has been derived. The maximum efficiency is achieved when the plasma expansion distance during laser heating is equal to the laser absorption length. Theoretically predicted dependence of the radiation efficiency on the plasma density was confirmed in a experiment using a particle-cluster target. By creating a relatively uniform density plasma with a 0.3 mm diameter by dispersing SnO_2 particles coated on a Si wafer, the conversion efficiency at 14-nm as high as 4 times of that for a solid density SnO_2 target was observed.



Expansion of particles observed by the scatter of a back-illuminating laser light. The image was taken at 150 microsecond after a laser-induced shock to disperse SnO_2 particles coated on a Si wafer.

Toshihisa TOMIE
Advanced Semiconductor Research Center
e-mail: t-tomie@aist.go.jp
AIST Today Vol. 4, No.8 (2004)11