

**Attachment I:** The g(r) curves of rapidly cooling metal Zr at 300K and 1900K. The experimental data are taken from literature [1].The simulated results agree well with the experimental values.

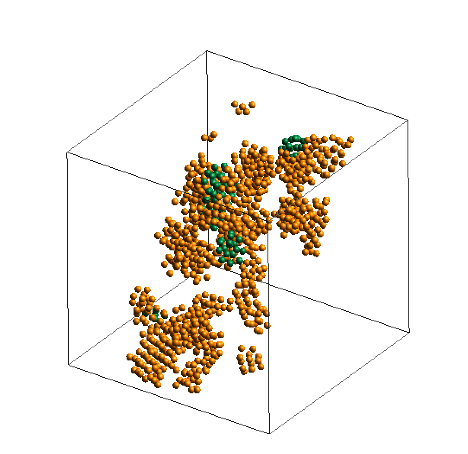
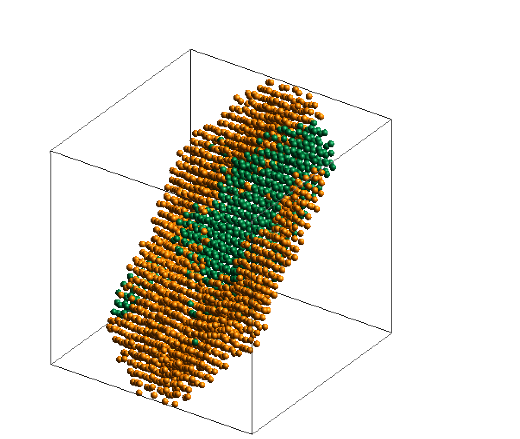
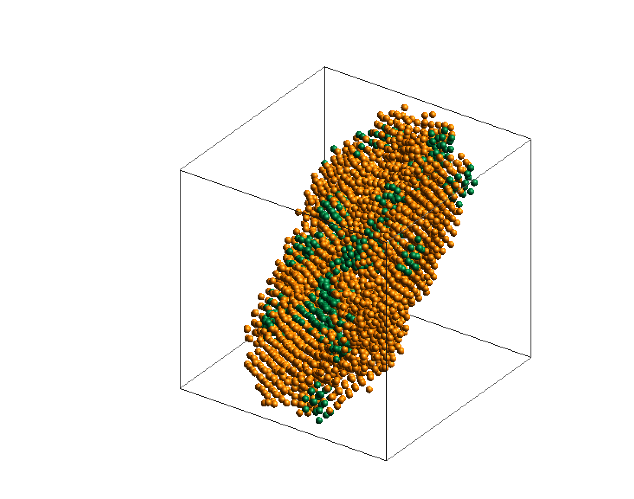


**Attachment II:** The potential energy per atom in the system vs. temperature T during the rapid solidification of liquid metal Zr. The glass transition temperature is estimated to be 741K.





**Attachment III:** The fraction of typical clusters in the systems at different time steps (a) *t*=0 ps and (b) *t*=2000 ps during relaxation at various temperatures.



*t*=21 ps *t*=65 ps *t*=638 ps

**Attachment IV:** Cross sections of the MRO structures during the crystallization of undercooled liquid metal Zr at 1000 K. Orange and green spheres correspond to BCC and HCP atoms, respectively.

**Attachment V:** (a) The potential energy per atom in the system during isothermal relaxation of supercooled liquid Zr at various temperatures;(b)-(d)Time dependence of the fraction of BCC and HCP clusters in the system during crystallization.

**Reference**

**[1]**  http://res.tagen.tohoku.ac.jp/~waseda/scm/LIQ/gr/Zr\_1900\_gr.txt