

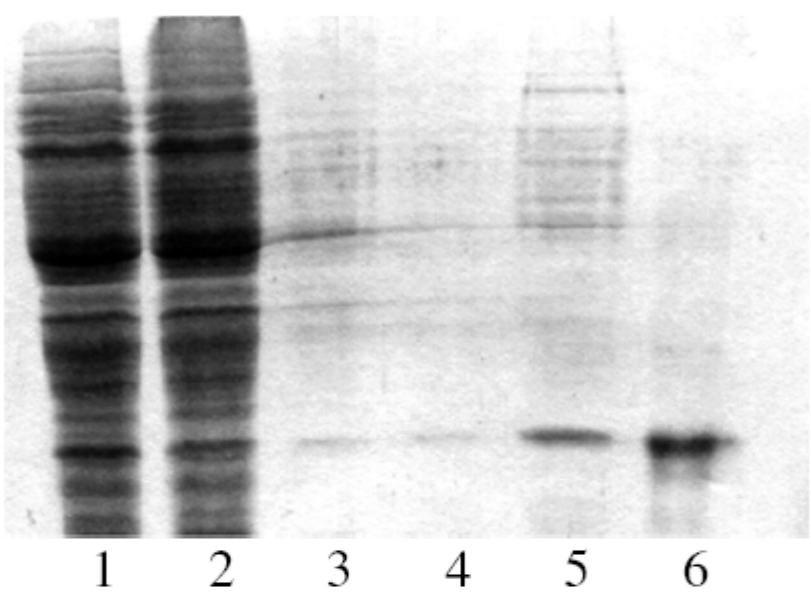
Novel pathway of nanodiamond-protein docking

Ivan A. Denisov, Peter I. Belobrov

Siberian Federal University, MOLPIT, Institute of Biophysics SB RAS, Krasnoyarsk, Russia

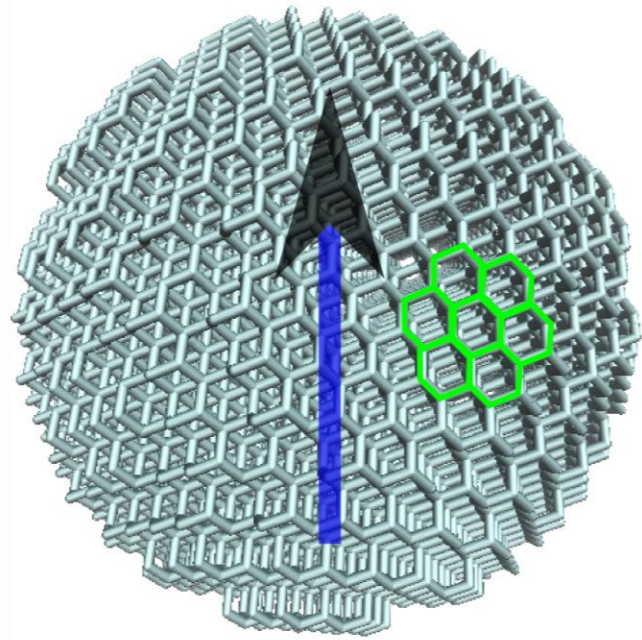
Problem

Why huge specificity of ND to the protein [3]?



An electrophoretogram of protein samples obtained as a result of apoobelin isolation from the *E. coli* cell extract. Apoobelin was isolated from the bacterial cell extract using the ND (1) The initial extract, (2) the extract treated with ND particles, (3) and (4) solution collected after washing the pellet of ND particles coated with apoobelin, (5) the final sample of apoobelin after elution with DTT, (6) a marker protein (apoobelin isolated by the standard procedure [10]). Electrophoresis was performed in 12.5% polyacrylamide gel in the presence of 0.1% sodium dodecylsulfate (SDS).

Diamond ball



Method

Synthesis of bio, chemical, & physical approaches

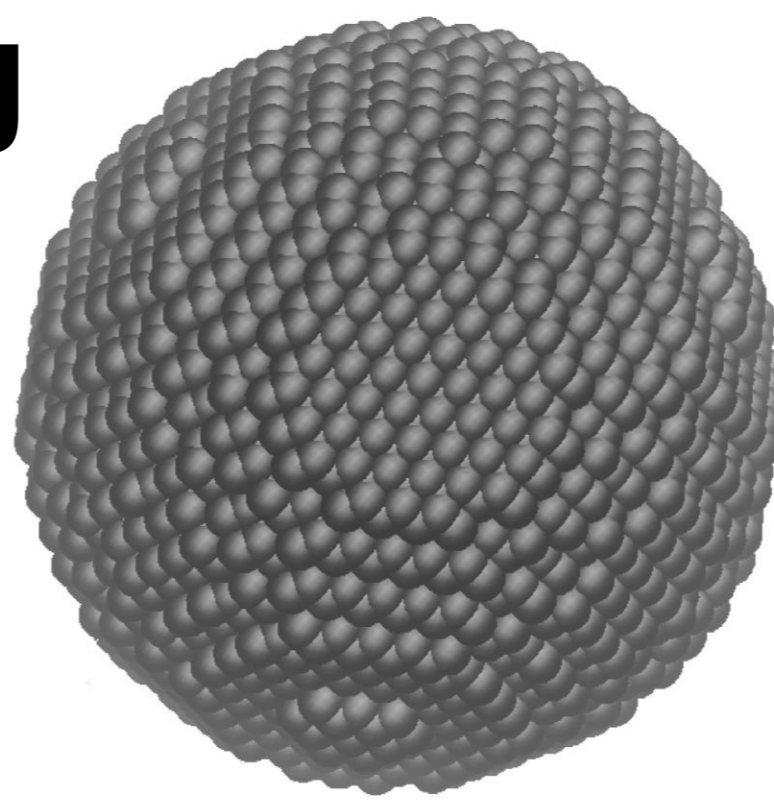
Docking

What?

For?

Where?

5nm diamond ball



Get the **nd.pdb** from our webservice <http://diaball.molpit.ru>

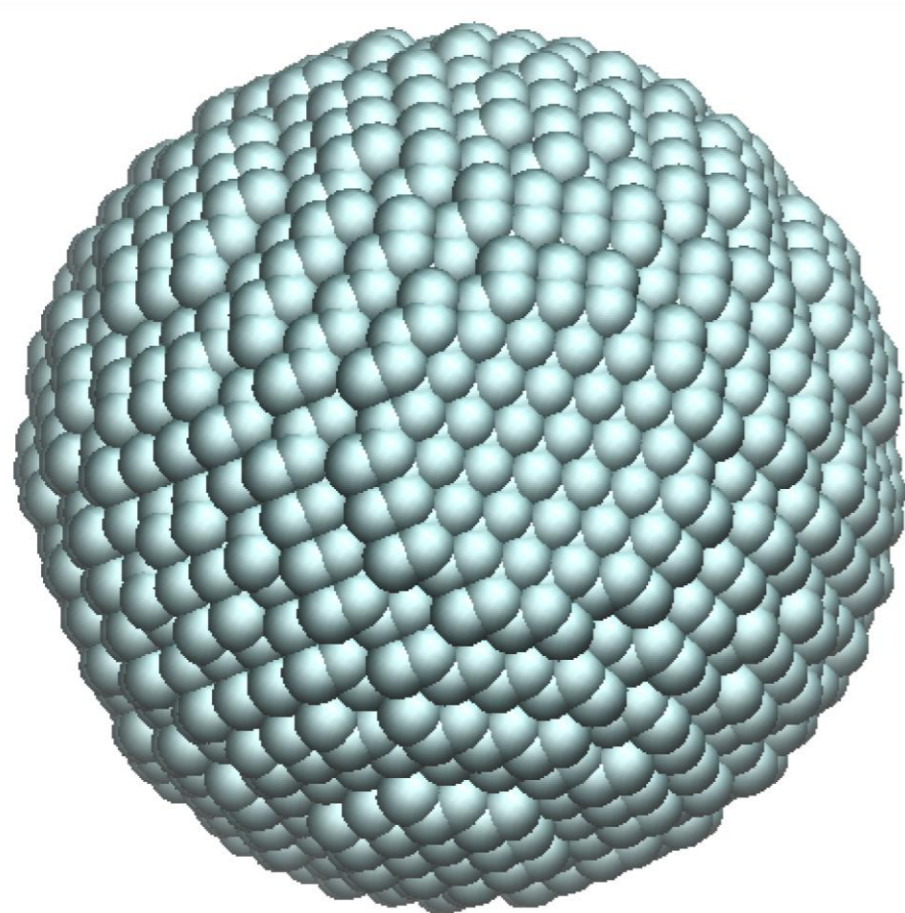
Technology

Tiny tech (NanoBio?)
LB films of ND with Luciferase
Multifunction emulsions
Microemulsion platforms
Microemulsion amplification

Possible pathway of docking

DiaBall

4.2nm diamond ball



HyperChem

1. Add Hydrogens or ANY radicals to the surface

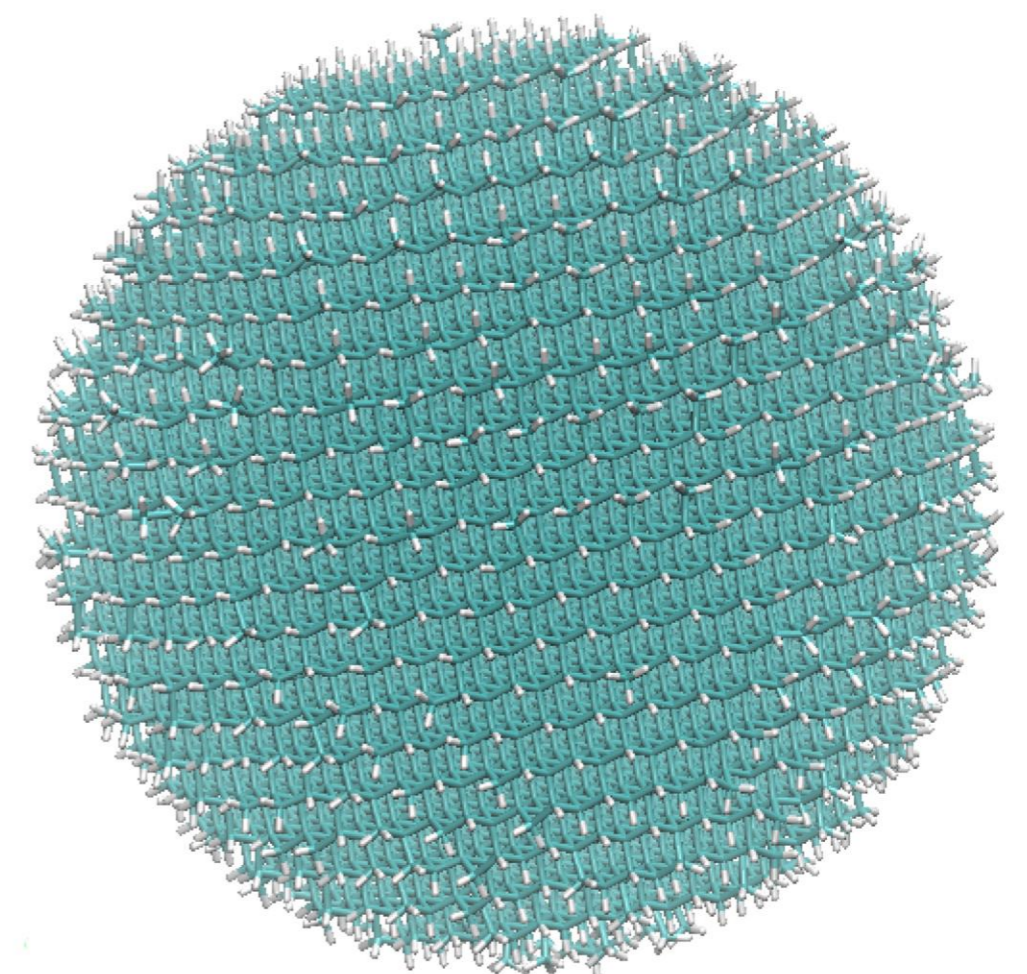
2. Relaxation of the structure

Protein-protein docking Software

VMD

VMD

4.2nm diamond ball relaxed + hydrogens

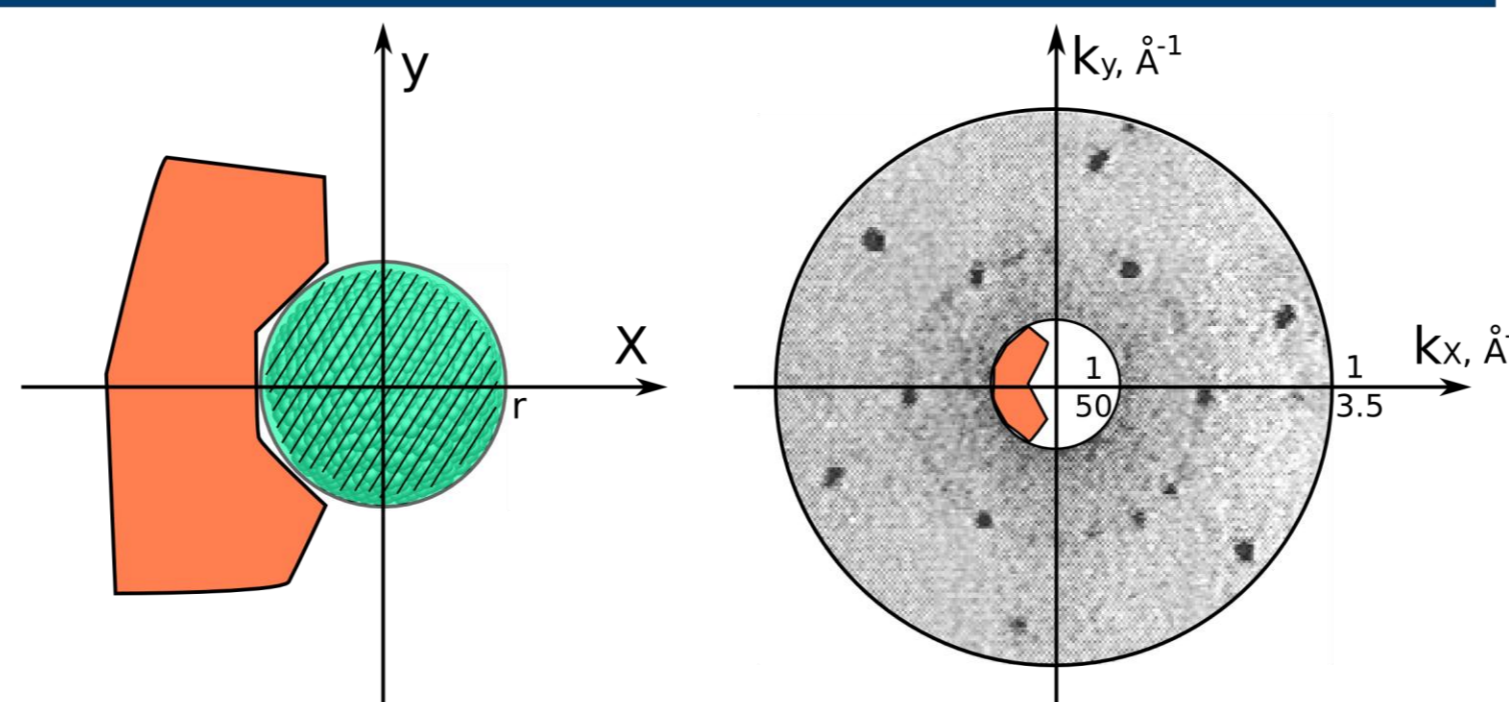
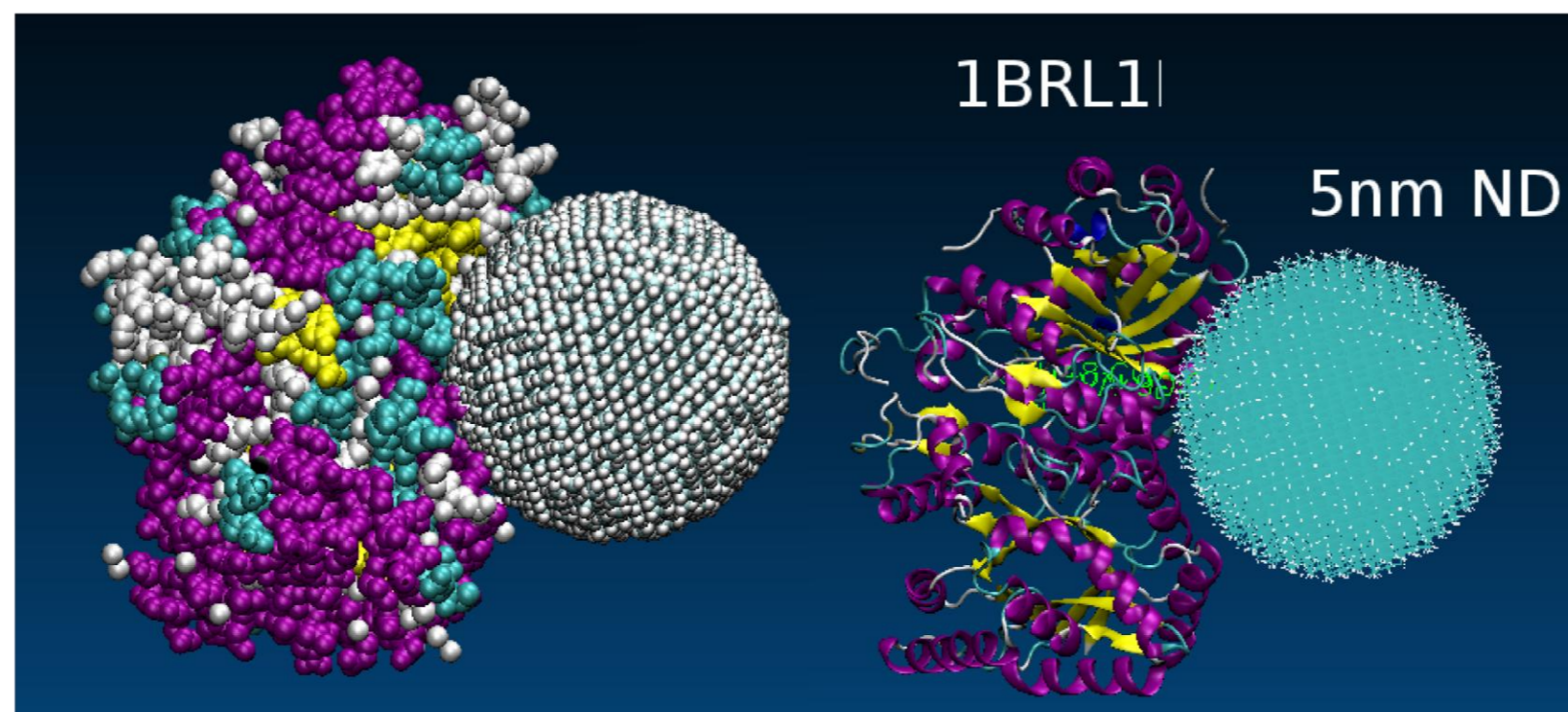


Soft matter

Self-assembling

Tamm surface states (Tammon)

Quasiparticles of collective excitations



Conclusion

Life is permanent docking

References (it is made in the first time):
 1. Belobrov P. I., Voevodin V. A., Erokhin V. V., Lvov Y.M., Petushkov V.N., Puzir A.P., Rodionova N.S. Interaction of bacterial luciferase with amphiphilic molecules in solution, on water surface, and in Langmuir-Blodgett films // *Preprint of the Institute of Physics* No. 92B, Krasnoyarsk, 1988, 28 p.
 2. V.A. Voevodin, P.I. Belobrov, V.V. Erokhin. Obtaining and some properties of Langmuir films from bacterial luciferase // In: *Biological Luminescence*, Singapore: World Scientific, p.375-385 (1990).
 3. V.A. Bondar, A.P. Puzyr. Use of nanodiamond particles for rapid isolation of recombinant apoobelin from *Escherichia coli* // *Doklady Biochemistry*, **373**, 129-131 (2000).
 4. A.P. Puzyr, V.S. Bondar, P.I. Belobrov, A.A. Bukaemskii. Preparation of complexes nanodiamond-protein-delta-aluminum oxide // *Doklady Biochemistry*, **373**, 139-141 (2000).
 5. A. P. Puzyr, A. A. Bukaemskii, P. I. Belobrov, and T. G. Volova. Uniform distribution and stabilization of nanoparticles in a bacterial poly-beta-hydroxybutyrate gel // *Doklady Biochemistry and Biophysics*, **376**, 23-25 (2001).