

# Scientists make first step towards 'holy grail' of crystallography

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Scientists from Imperial College London and the University of Surrey have developed a new technique for crystallising proteins, a discovery which could help speed up the development of new medicines and treatments.

Crystallisation is the process which converts materials, such as proteins, into three dimensional crystals, thus enabling their atomic structure to be studied. The three dimensional structure of the crystals indicates the proteins function, and from this, researchers hope to be able to develop more effective treatments.

However, production of high quality crystals has long posed a major bottleneck for X-ray crystallography. This problem has become increasingly acute with the advent of structural genomics and proteomics which aim to determine the structures of thousands of proteins. Protein crystallography plays a major role in this understanding because proteins, being the major machinery of living things, are often targets for drugs.

To direct the proteins to become crystals, researchers use a substance called a nucleant, which does this by encouraging protein molecules to form a crystal lattice.

The research published online in *Proceedings of the National Academy of Sciences*, shows how the team, consisting of bio-medical scientists, material scientists and physicists, collaborated to develop a theory

concerning the design of porous materials for protein crystallisation and put it into practice. The theory is based on the rational that the porous structure of a material, traps the protein molecules, and encourages them to crystallise.

They tested the theory using BioGlass, a substance developed by Imperial's material scientists, as a scaffold to trap and encourage the growth of protein crystals. BioGlass is a porous material, with a variety of different size pores able to trap different size proteins.

They found BioGlass induced the crystallisation of the largest number of proteins ever crystallised using a single nucleant.

Professor Naomi Chayen, from Imperial College London, who led the research, said: "The first step in obtaining a good crystal is to get it to nucleate in an ordered way. The 'holy grail' is to find a 'universal nucleant' which would induce crystallisation of any protein. Although there has been considerable research in search of a universal nucleant, this is the first time we have designed one which works on a large number of materials."

The researchers plan to commercialise this discovery using Imperial Innovations, the College's technology transfer company.

Source: University of London

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