

The nanostructure problem: challenges, progress, opportunities

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Modern materials under study for next generation technologies, such as for energy conversion and storage, environmental remediation and health, are highly complex, often heterogeneous and nano-structured. A full understanding of the structure requires us to go beyond crystallography and to study the local aperiodic components of the structure, which is a major experimental challenge. There are recently emerging powerful experimental and theoretical developments that are bringing us close to being able to address this problem, ranging from powder to single-particle methods. I will give a personal view about the current state of affairs, highlighting what I see to be the main challenges and opportunities if these can be overcome. The most exciting developments are happening at a nexus of physics, chemistry, applied mathematics and biology and this is a rich and truly interdisciplinary activity.