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3D Printing of Crystallographic Models for Interdisciplinary College Education

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3D printing of crystallographic models for interdisciplinary college education

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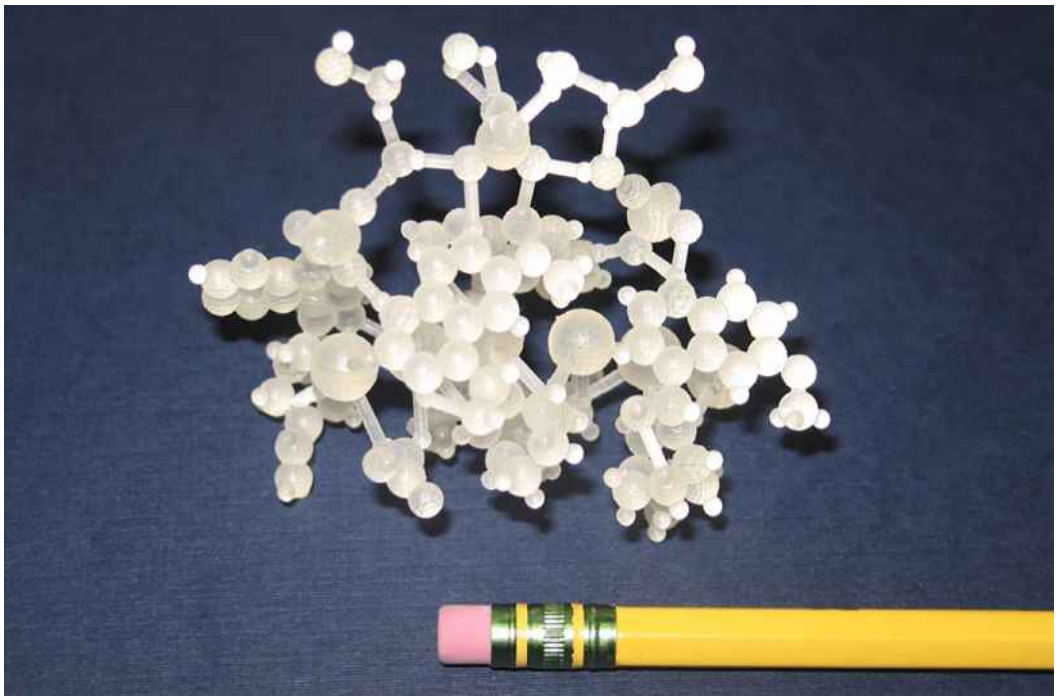
Crystallographic models of molecule and crystal structures, crystal morphologies, Bravais lattices, space and point group symmetries, highly local and extended crystal defects, … can all be encoded in the Crystallographic Information Framework (CIF) file format. While 3D printing has been available for at least 20 years, cost and performance improvements have only recently made 3D printing practical for usage by college educators and the general public. There is also an industry wide 3D printing standard, the STL file format. Virtual reality freeware programs that include conversions from CIF to STL are openly available [1]. The more than 250,000 entries Crystallography Open Database (COD) has in recent years developed into the world's premier open-access source for CIFs of structures of small molecules and small to medium sized unit cell crystals [2]. The International Advisory Board of the COD also supports a related project [3a], which provides CIFs for interdisciplinary college education. Three of these "COD offspring" databases have started to provide for free downloads of STL files of small molecules, crystal morphologies, and grain boundaries [3b]. These 3D printing files were created directly from the CIFs in these databases. It is now up to interested college educators to develop new pedagogy in teaching crystallography on the basis of 3D models that can be printed out from these files. To facilitate further developments in this field, there is a web portal of open-access crystallography resources to which all interested college educators are invited to contribute [3c].

[1] *http://cad4.cpac.washington.edu/cif2vrmlhome/cif2vrml.htm and http://cad4.cpac.washington.edu/WinXMorphHome/WinXMorph.htm.,* ***[2]*** *http://www.crystallography.net/, American mirror: http://nanocrystallography.org/.,* ***[3]*** *[3a] http://nanocrystallography.research.pdx.edu; [3b]* *Support from NSF grant EEC-1242197 is gratefully acknowledged; [3c] http://nanocrystallography.net.*



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