Topology of disordered graphene networks

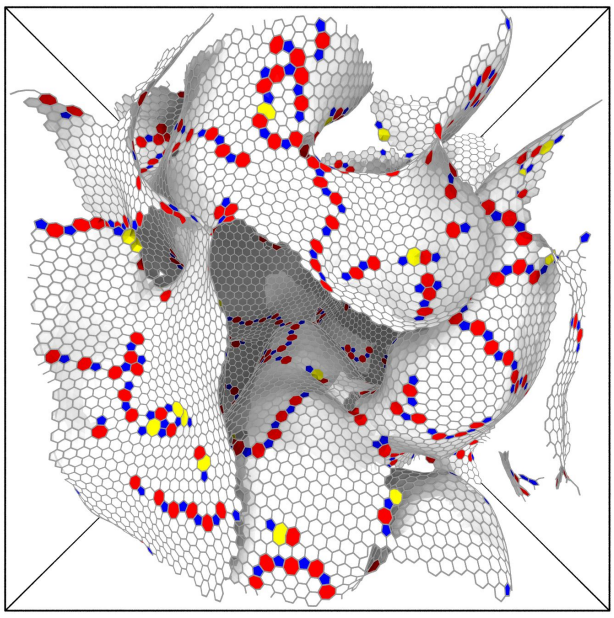
Jacob W. Martin,[1]* Carla de Tomas,[2] Irene Suarez-Martinez,[2] Markus Kraft[1] and Nigel Marks[2]

[1]Department of Chemical Engineering and Biotechnology, University of Cambridge, West Site, Philippa Fawcett Drive, Cambridge, CB3 0AS, United Kingdom

[2]Department of Physics and Astronomy and Curtin Institute for Computation, Curtin University, Perth 6012, Australia.

Email address of presenting author: jwm50@cam.ac.uk

Insight into the long-standing problem of disordered graphene networks is approached using a new mesh-based topological analysis. Nanocarbon models, previously prepared using annealed molecular dynamics and providing close agreement to structural and electronic experimental measures [1], were converted into a triangular surface mesh for topological analysis. All the analysed isotropic carbon surfaces contained regions that are Gauss flat and regions of positive and negative curvature, with negative curvature dominating. Resolution of topological complexities such as ribbon development are found to be due to a small fraction of non-sp^2 carbon atoms, providing insights into porous carbons such as the integration of flexoelectricity [2], glassy carbon ribbons and the graphitisability of carbon materials.



References:

1. C. de Tomas et al., *Appl. Phys. Lett.*, **2018**, 112, 251907
2. J.W. Martin et al., *J. Phys. Chem. C*, **2017**, 121, 27154-27163