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Molecular resolution imaging of growing Triosephosphate isomerase crystals

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In this work high resolution atomic force microscopy images of Triosephosphate isomerase from *Thermotoga maritima* (TmTim) [1] are presented. Crystal growth proceeded through step advancement and 2D-nucleation onto the crystal surface. Growth through spiral dislocations has not been visualized. The 2D-nuclei that landed on the crystal surface were circular in shape. When reaching a size of roughly 100 nm, a typical triangular morphology became apparent. This morphology can be explained by a growth anisotropy that favors distinct crystallographic directions. Visualization of these 2D islands at a molecular resolution has shown that they are aligned with the underlying crystal lattice. Aggregates measuring approximately 30 - 40 nm in size were also observed on the crystal surface. As opposed to the larger 2D-nuclei these did not grow out to form steps. However they were incorporated in the crystal lattice of advancing steps without any apparent mismatching. Disabled slow scan axis measurements yielded pseudo-images from which could be concluded that these small aggregates have a residence time on the surface ranging from a few seconds to multiple minutes.

[1] Maes, D.; Zeelen, J.P.; Thanki, N.; Beaucamp, N.; Alvarez, M.; Thi, M.H.; Backmann, J.; Martial, J.A.; Wyns, L.; Jaenicke, R. and Wierenga, R.K.: The crystal structure of triosephosphate isomerase (TIM) from *Thermotoga maritima*: a comparative thermostability structural analysis of ten different TIM structures, *Proteins* vol. 37, pp. 441-453 (1999).

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Aurophilic interactions in polynuclear Au(I) complexes with phosphine ligands containing imidazole rings

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The tertiary phosphines of the type (Bzim)_{3-n}Ph_nP, where Bzim is 1-benzyl-2-imidazolylphosphine and n varies from 0 to 2, were synthesised as part of a program aimed to the study of the coordination chemistry of phosphines containing imidazole rings. The softer character of imidazole, with respect to other heterocycles, turned out to be useful in the stabilization of complexes with soft metals as those of Group 11 in low oxidation states. These ligands can behave as monodentate or as P, N bidentate forming dinuclear cationic complexes. With Au(I) they were found to be able to favour the formation of intra- and intermolecular aurophilic interactions. The Au(I) complexes assume considerable interest when aurophilic bonds occur between gold atoms, since their chemical and physical properties change to particular characteristics with potential applications in electronic, optical or sensor devices. In particular short Au...Au interactions are considered related to optoelectronic properties as observed in a number of polynuclear gold compounds. Here the structures of two Au(I) complexes are reported. The binuclear complex [μ -(Bzim)Ph₂PAu₂(C₆F₅)₂] adopts a folded conformation with parallel, eclipsed C₆F₅ rings and a corresponding short Au...Au contact of 3.033(2) Å. The tetranuclear cluster complex {[μ -N,N'-(Bzim)₃PAuCl]₂Au₂}²⁺·AuCl₂⁻·AuCl₄⁻ consists in a 12-membered macrocycle with two gold atoms coordinated to two (Bzim)₃P molecules, in bridging mode, through the nitrogen atoms of the imidazole rings and two gold atoms coordinated to the phosphorus atoms of the (Bzim)₃P ligands. Two chloride atoms complete the Au bicoordination. Three strong aurophilic interactions, Au(1)...Au(4) [2.989(2) Å], Au(2)...Au(3) [3.014(2) Å] and Au(1)...Au(2) [3.257(3) Å], occur. A weak gold-gold contact, Au(3)...Au(4) [3.766(2) Å], is also present.

