



Experiment Report Form



	<p>Experiment title: Metals as hosts for organics: Deciphering the mechanism by amino acids and peptides get incorporated into single crystals of metals and correlation with physical properties</p>	<p>Experiment number: CH 5001</p>
<p>Beamline: ID22</p>	<p>Date of experiment: from: 13 September 2017 to: 18 September 2017</p>	<p>Date of report: 19/02/2020</p>
<p>Shifts: 15</p>	<p>Local contact(s): MOGODI Mashikoane Wilson</p>	<p><i>Received at ESRF:</i></p>
<p>Names and affiliations of applicants (* indicates experimentalists): Main proposer: Prof. POKROY Boaz*, Laboratory Technion - Israel Institute of Technology Department of Materials Engineering Technion City IL - 32000 HAIFA</p>		

Report:

The work performed during this beamtime was published in: Chen L, Polishchuk I, Weber E, Fitch AN, Pokroy B. [Hybrid gold single crystals incorporating amino acids](#). *Cryst Growth Des* 2016;16:2972.

Abstract:

Composite hybrid gold crystals are of profound interest in various research areas ranging from materials science to biology. Their importance is due to their unique properties and potential implementation, for example, in sensing or in bio-nanomedicine. Here we report on the formation of hybrid organic-metal composites via the incorporation of selected amino acids (histidine, aspartic acid, serine, glutamine, alanine, cysteine, and selenocystine) into the crystal lattice of single crystals of gold. We used electron microscopy, chemical analysis, and high-resolution synchrotron powder X-ray diffraction to examine these composites. Crystal shape, as well as atomic concentrations of occluded amino acids and their impact on the crystal

structure of gold, was determined. Concentration of the incorporated amino acid was highest for cysteine, followed by serine and aspartic acid. Our results indicate that the incorporation process probably occurs through a complex interaction of their individual functional groups with gold atoms. Although various organic-gold composites have been prepared, to the best of our knowledge this is the first reported finding of incorporation of organic molecules within the gold lattice. We present a versatile strategy for fabricating crystalline nanohybrid-composite gold crystals of potential importance for a wide range of applications.