**1st Webinar Series on Historical Metallurgy**

**Sep 2, 2021 12:00 PM Eastern Time (US and Canada)**

**Microstructure of Ancient and Historic Copper-Based Artifacts, by Omid Oudbashi, and Fractography of Ancient Metal Artifacts and Restoration and Conservation, by Russell Wanhill.**

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**BIOGRAPHY OMID OUDBASHI**

Omid Oudbashi holds a BSc, MA and PhD in Conservation of Cultural and Historical Properties and is currently Associate Professor in the Department of Conservation of Cultural and Historical Properties, Art University of Isfahan, Iran. His research interests are the deterioration of archaeological objects, especially the corrosion mechanisms of ancient metals in terrestrial, marine and outdoor environments; preventive and archaeological conservation; archaeometallurgy; ancient mining and metalworking in the ancient world; and metallography of ancient and historic metals.

**Microstructure of Ancient and Historic Copper-Based Artifacts**

Ancient and historic copper-based artifacts are one of the main groups of metallic objects used from about ten thousand years ago. These include unalloyed copper objects as well as different copper alloys such as arsenical copper, tin bronze and brass with varying compositions. This presentation tries to give an overview about microstructural aspects of different copper-based alloys used in ancient times and the application of metallographic and microscopic methods to show these features. Some examples of copper-based artifact microstructures are shown, and reasons are given as to why these microscopic phenomena have formed.



**BIOGRAPHY RUSSELL WANHILL**

Russell Wanhill is an emeritus principal research scientist (metallurgist) from the Royal Netherlands Aerospace Centre (NLR). He has authored and co-authored over 150 service failure reports for the NLR, and about 180 reports and publications on the engineering properties of aerospace alloys. He is currently active in co-authoring and editing books on aerospace materials and technologies. Particular interests include aircraft service failures, practical fatigue crack growth analyses, quantitative fractography, stress corrosion cracking of aerospace alloys, and embrittlement (cracking and corrosion) of ancient metals (gold, bronze, iron, silver). He has published several archival papers on ancient silver embrittlement.

**Fractography of Ancient Metal Artifacts and Restoration and Conservation**

Fractographic analysis of ancient metallic artifacts is a minor or non-existent consideration for most archaeometallurgical investigations. For example, there are excellent books and symposium proceedings with metallographic and chemical analyses, but no fractography; and authoritative publications on research frameworks and guidelines that do not mention fractography. This presentation gives an overview, using case studies, of fractures and cracks in ancient gold, silver, copper and iron alloys. We show that fractography is a useful – sometimes essential – adjunct to metallography, and could improve restoration and conservation.