A new Approach in studying Ancient Cu-Sn Artifacts: Measure of Crystal Orientation and Phase Distribution by EBSD Analysis

<u>Federico Zaghis</u>^a, ^bLuca Peruzzo, ^aGabriella Salviulo, ^aGianmario Molin, ^aDepartment of Mineralogy and Petrology, University of Padova. ^bCNR-IGG, Padova, Italy. E-mail: federico.zaghis@unipd.it

Electron back-scattered diffraction (EBSD) is based on the acquisition of diffraction patterns from bulk samples in the scanning electron microscope (SEM) [1]. In this work EBSD has been applied to analyze crystal orientations and to identify phase distribution in ancient Cu-Sn alloys.

Samples are small fragments of finished artifacts found at the exceptional Final Bronze Age site of Frattesina di Fratta Polesine, in the Po delta area.

Using literature lattice parameters it was feasible to identify distribution of the α , β , ϵ Cu-Sn phases in selected areas of the samples. Since during manufacture external stresses influence microstructure and induce phase transformations particularly deformed areas were observed.

EBSD maps of strongly stressed zones clearly detected the alignment of predominant cubic α phase in the same direction with the length of the specimens.

EBSD features have been also correlated to grain boundaries previously resolved by optical micrographs in order to determine the relative misorientation of grains, the occurrence of annealing twins and the existence of intracrystalline microconstituents.

[1] Prior D.J., Boyle A.P., et al., *Am. Mineral.*, 1999, **84**, 1741-1759. Keywords: EBSD, Cu-Sn alloy, phase distribution