CONFERENCE REVIEW

Early High Technology Ceramics Meeting 27th April 2017, UCL Institute of Archaeology

Sarah Dillis[1], Anneleen Stienaers[1], and Alicia Van Ham-Meert[1,2]

[1] Earth and Environmental Science, Centre for Archaeological Science, KU Leuven, Celestijnenlaan 200E, B-3001 Heverlee, Belgium
[2] Analytical, Environmental and Geochemistry, Vrije Universiteit Brussel, Triomflaan 2, B-1050 Elsene, Belgium

After a warm welcome and registration, Trinitat Pradell started the meeting by presenting the analysis of Jun wares by SEM and FIB with a particular focus on the role of nanostructures in areas of the glaze showing different colours and optical properties. Origins of colours and appearances were discussed in terms of chemistry and nanostructure. Scattering and absorption of light by different size nanoparticles and oxidation states of iron, titanium and copper give different colours. Differences between kilns were highlighted. The presentation ended with a question regarding how nanostructures influence the physical properties of fluids.

The next presentation was by Nigel Wood on SEM-EDS analyses of a life-sized lead-glazed *luohan* statue, found in a remote mountain cave in Yixian, China, and now in the possession of the State Hermitage in Saint Petersburg. He demonstrated a clear link with other statues from the cave and the Liuliqu kilns in Beijing which were already in operation in the 13th century and are still active today. The manufacturing technique was unusual as the life-size statues were hand-built and made on a structure of iron bars, much like those used in sculpting.

In the final lecture of the first session, Shan Huang described how transfer of knowledge and objects from Southern China to Northern China lead to a virtually 2-step evolution from the use of pure kaolinite clays with a greenish glazing, to colourless lead-glazing, finishing with colourless alkali glazing. Merging of technologies finally led to the birth of Chinese white porcelain.

The second session began with a presentation by Ian Freestone describing work carried out with Rita Gianinni on Qing dynasty enamelled porcelain. He explained that Chinese cobalt, which is high in manganese, gave a fine blue colour at higher temperatures (1300°C). However, at low temperatures (800°C) used for enamels, it turned to unwanted colours. Therefore, Chinese cobalt was used for blue underglaze, whereas European cobalt, which is low in manganese, was used for blue overglaze. European cobalt was first imported into China as smalt, followed by local porcelain production, after which much of the material found its way back into European markets.

Continuing with cobalt as a raw material, Moujan Matin characterised the cobalt pigments from the Kashan mines in Iran and compared preparation techniques described in Persian and Chinese texts. The data thus produced allows assessment of whether cobalt in glazes from the Islamic period came from Kashan or not. This concluded the morning session, which had provided a lot of stimulating ideas.

After the lunch break, Zahed Tajeddin started the afternoon session by presenting an ethno-archaeological study of faience beads from Iran. Following a general introduction on various production methods for faience, he showed how production technology was essentially unchanged since the Early Bronze Age, but that craftsmen had

recently changed to industrially produced raw materials. The element which had long been a trade-secret is dung which provides the chlorine needed to carry the cobalt to the surface. In addition, he also makes artworks in faience which were on display in the Manchester Museum until the 30th of June.

Continuing with the beads theme, Victoria Benson discussed a bracelet of glass beads from tomb 27 associated with the Harem palace in Gurob, originating from between the reigns of Amenhotep I and Tuthmosis III. The beads appeared to be Mesopotamian blue glasses (probably brought with one of the ladies of the Harem). A few quartz beads with a blue glazed surface layer, which were shown to be the same glass as the fully blue beads, were also part of the bracelet. An interesting discussion on the effect of the blue glass on the quartz ensued.

Marcos Martinón-Torres started the final session of the meeting with a presentation on a selection of gold-smelting crucibles from the colonial period in Colombia and showed that, apart from the known European crucibles used in Santa Cruz, there was an illegal gold market using local clays and crucible design. He encouraged further research on metalworking crucibles in the New World to understand why metallurgists from different places used crucibles imported from different locations in Europe and/or local crucibles.

The next presentation was given by Justine Bayley from the Historical Metallurgy Society and described the function and properties of ceramic crucibles for metallurgical use over a wide time scale. She illustrated the desirable refractory and mechanical features required, and special shapes of some crucibles depending on the hearth or furnace arrangements. Overall, the wide variety of crucibles that are found showed that in practice many shapes work and later domestic pots have also been used in metallurgy.

The final presentation was by Carlotta Gardner who described the trial and error process of reconstruction experiments which finally allowed her to produce a double layer ceramic test bar comparable to Roman metalworking crucibles which have an extra outer layer of a different clay. The tests showed an increased ductility and toughness at high temperature by the combination of two clay layers. The difficulty in obtaining a thermally functional 2-clay test bar illustrates the skill and knowledge of the Roman metalworkers in producing a practical solution for successfully handling molten metal.

This concluded a highly interesting meeting with excellent talks that stimulated discussion. We also appreciated how the different lectures followed a general narrative, with lectures on related subjects in each session.

In addition, the refreshment breaks also receive commendation as participants were well looked after during the entire day, and we look forward to attending the next meeting.