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Analytical characterization of copper-based metal sculptures in Portugal in 1880-1990: the artwork of Soares dos Reis

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António Soares dos Reis (1847-1889) is considered one of the most important Portuguese sculptors of the 19th century. His work marked the end of Portuguese Romanticism and the beginning of Naturalism. Due to his premature death, his artistic production can be considered modest but of the highest technical quality. Since the sculptor did not leave documents that can help to the understanding of his artistic creative process the main sources are the artworks.

Although it is currently possible to find a significant amount of his artwork in bronze, the number of metal casts made during the artist's life is very limited. Accordingly, there are only a few sculptures in bronze made during his lifetime. Instead most of his bronze sculptures, the major part displayed both in museums and outdoors, dates from the 20th century, spanning from the first decades to the 1990s.

The study, supported by the Portuguese ERIHS.PT platform, focused on six sculptures using an integrated multi-analytical approach combining by Energy Dispersive X-Ray Fluorescence analysis (EDXRF), Scanning Electron Microscopy with Energy Dispersive X-ray spectroscopy (SEM-EDS), Raman and FTIR spectroscopy to characterize the sculptures with the aim to determine their elemental composition and technological features. Also, a Monte-Carlo approach was used to further a non-destructive study of the metal layers.

The main results of this study allowed to obtain the characterization of the bulk metal and its patina and to distinguish the corrosion patterns from internal and external environments. This study will also enable to get a deeper knowledge on evolution of the Portuguese art foundry industry, namely materials, and technical changes between the late 19th century and the 20th century.