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Z₆₀, Phantasphaeraurate

Discovery of new substances and their underlying principles consists *not* so much of "new materials analyzed by established methods" but rather of ancient ones elucidated by newly developed methods. So we had better focus on the advances — new instruments and procedures — that make discovery possible, prior to any particular application. Year 2014 marks the Centennial of Mass Spectrometry. Mass spectrometers (MS) are best known as ultrahigh precision, ultra-sensitive instruments. Yet they have been remade thanks to the new ion sources based on ElectroSpray (ES), as recognized by the 2002 Nobel Prize (John B. Fenn). Here at UTSA we are blessed with excellent MS instrumentation, which we have adapted to apply the ES-MS to a seemingly intractable metallurgical problem. We were motivated by longstanding questions regarding the geological and microbial origins of noble metals (such as gold and copper) in reduced (metallic) phases. A surprising new principle, denoted Z₆₀, has emerged from this work, to explain the main anomaly. Beyond the elucidation of structure & bonding relations, the Z₆₀ principle reveals certain aspects of hidden symmetry and a special topology. The latter provides a direct mapping to a cultural artefact largely unknown in the West, and thus well suited to broader educational purposes. Many UTSA colleagues & students have been involved already in key aspects of this exciting experimental & theoretical research. Their respective contributions will be briefly described. Also advertised are abundant opportunities for further development of these methods and systems, in order to attain new insights and products.



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