



## Odontology Section - 2015

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### **G24 Scanning Electron Microscopy (SEM) and Energy Dispersive X-Ray Spectroscopy (EDS) of a Supposed “Gold Dental Crown”**

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After attending this presentation, attendees will better understand the role of the SEM and EDS used in the analysis of a dental crown that was the subject of an investigation. Attendees will also learn the role of SEM/EDS in the field of forensic odontology.

This presentation will impact the forensic science community by providing an option for the analytical examination of dental materials in areas other than forensic human identification purposes. This presentation also demonstrates the application of SEM/EDS in the standard-of-care field in forensic odontology.

In today's world of global marketing, it is easy for a person to buy and sell any items overseas. It is also cheaper to have an item made overseas and subsequently imported into the country for sales; this is widely used in many industries, dentistry included.

There are several news articles about local dental laboratories outsourcing dental lab work to another country for manufacturing or of dentists sending their dental lab works overseas for fabrication of the dental work. The main reason is due to cost-cutting and is profit driven. Local dental laboratories have to comply with the rules and regulations set out by the state or country; however, overseas laboratories may not comply with any regulations at all. Dentists or the local laboratory owners will never know what the actual ingredient or actual content of the requested manufactured dental laboratory work is, until an issue is raised that requires further investigation. Is the received dental gold crown actually made of gold?

This study was consulted by a dental colleague about a full gold dental crown that discolored in less than two weeks post-cementation. The patient was unhappy and the gold dental crown was removed and refabricated. The dental colleague was told by the dental ceramist that the particular gold dental crown was made of high precious metal dental alloy (the piece of dental alloy was manufactured by a particular dental company) and was curious why the gold dental crown discolored.

SEM/EDS examination revealed that this particular “gold dental crown” was not made from high precious dental alloy and that the discoloration of the gold-colored dental crown was actually copper oxidization.

Recent research has shown that restorative dental materials can be recognized by microscopy and elemental analysis. These analytical methods of dental materials properties have proven useful in Disaster Victim Identification (DVI) and in a number of other victim identification cases. This report provides another role that SEM/EDS analysis can play in forensic odontology and dentistry in general.

This presentation highlights the importance of dental material science and scientific analysis in the field of forensic odontology.

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#### **Forensic Odontology, Dental Materials, SEM/EDS**