

According to a report published by the National Institute for Occupational Safety and Health, unwanted nitrous oxide ( $N_2O$ ) exposure levels in dental operation rooms, which should be around 50 parts per million (ppm), were shown to be as high as 1000 ppm.<sup>1</sup> When  $N_2O$  is inhaled, it is rapidly absorbed through the lungs to the alveoli, blood, and tissues.<sup>2</sup> Overexposure can result in adverse health effects such as neurological, renal, and liver disease. Current  $N_2O$  detection methods, which use IR spectroscopy, are not used in dental offices because they are very costly. A cheaper, alternative method must be implemented to alert dental health professionals of  $N_2O$  overexposure. Our proposed solution is to use a contact potential device, which uses alpha particle emission to measure the work (delta V) required to remove an electron from the interior lattice of two solids to an external point at zero potential. A sterilized semiconductor prism must be placed into the device to yield a measurement. It has been hypothesized that a specific concentration of  $N_2O$  will correspond to a specific delta V reading on the contact potential device and thus, the contact potential device can be used as a detector for dangerous levels of  $N_2O$ . Currently we have used an IR spectrometer to detect certain covalent bonds within specific gases. This is so that we can calibrate the contact potential device with the IR spectrometer. We are now trying to coat the prisms with different monolayers to determine which monolayer gives the most consistent contact potential readings.

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<sup>1</sup> "Controlling Exposures to Nitrous Oxide during Anesthetic Administration." Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, 06 June 2014. Web. 02 Oct. 2014.

<sup>2</sup> Cohen; Brodsky, "Adverse effects of nitrous oxide" Medical Toxicology 5 (1986) 362-374. PubMed with full text. Web. 15 Nov. 2015.