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Funding Source: Louis Stokes Missouri Alliance for Minority Participation

Study of impurities and color effects on gemstones

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Gemstones are found in a variety of colors but, what causes it? The color of gemstones is due to different impurities that are on the surroundings of the mines. In this project, researchers at the University of Missouri Columbia are using different processes to change the atomic structure of gemstones, create impurities and cause a change of color. In order to do that, the gemstones have to be characterized. The characterization process consists in measure the mass once a day, for three days to see if it remains constant. With a Raman Spectroscopy of each sample we can measure the wavelength and intensity of the molecules when radiation passes through them in a second. The Fourier Transform InfraRed Spectroscopy (FTIR) uses an infrared source to excite the sample. These spectrums identify a compound and it composition. In addition, the UV Spectroscopy is used to identify the type of atom of an element. This analysis gives us specific information about the sample's properties. After all this data is analyzed, the samples are annealed for six hours. The annealing process is held on a Cold Wall Reactor. This reactor maintains a constant temperature gradient on the walls and works in vacuum. This is a low pressure treatment, which is 10 to 20 mmHg and the maximum temperature reached is 1200˚ C. When finished, the spectroscopy tests are repeated and compared.