# LASER INDUCED BREAKDOWN SPECTROSCOPY: IDENTIFICATION OF MOLECULES BY CONSTIUENT ELEMENTS

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Laser Induced Breakdown Spectroscopy (LIBS) is an analytical technique for elemental analysis capable of identifying all elements of a sample in real time. LIBS has several key properties: (1)requires no sample preparation, (2)high sensitivity, (3)can be made rugged and field portable, and (4)can be operated as a point detector or in stand off mode. During the LIBS event, a microplasma is formed on the sample surface. However, a more complete understanding of the LIBS phenomena is necessary to build a more useful chemical sensor. At the Army Research Lab we are pursuing a number of projects involving LIBS. We have designed our experimental setup to allow us to study the spatial and temporal distribution of an excited state chemical species within the plasma. Our setup includes a broadband spectrometer, capable of capturing all atomic, ionic, and molecular emissions that occur over a spectral range of 200-980 nm. Thus, we are able to identify molecular and biological species based on their elemental composition and abundance. The abundance of the constituent elements in a LIBS spectrum of an unknown compound are compared to a library of LIBS spectra in order to identify the species. We will discuss our results for a variety of LIBS experiments. In particular we will focus on the detection and identification of chemical warfare surrogates.