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# Photon Level Chemical Classification Using Digital Compressive Detection

**Digital compressive detection offers rapid and accurate chemical classification by minimizing classification error with minimal photon requirements, enabling high-speed chemical analysis.**

Many applications in biology, medicine, manufacturing, and security require the rapid identification and quantification of chemical species within complex mixtures. Methods, such as hyperspectral imaging and monitoring of dynamic chemical processes paired with multivariate statistical techniques, are often used for chemical classification. One problem for high-speed chemical analysis is the time required to collect and analyze hyperspectral data.

Purdue University researchers have developed a new strategy for rapid and accurate chemical classification. This strategy, digital compressive detection, can be used to classify substances with various degrees of spectral overlap. Digital compressive detection can also positively distinguish chemical species by detecting as few as 10 scattered photons, which could require as little as 30 microseconds. While previous strategies focused on minimizing spectral differences, digital compressive detection is optimized to minimize the error in the chemical classification.

**Advantages**:

-As few as 10 to 25 photons per measurement required for accurate classification

-Optimized to minimize error

Potential Applications:

-Biology

-Drug development

-Manufacturing

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**Category**

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Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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