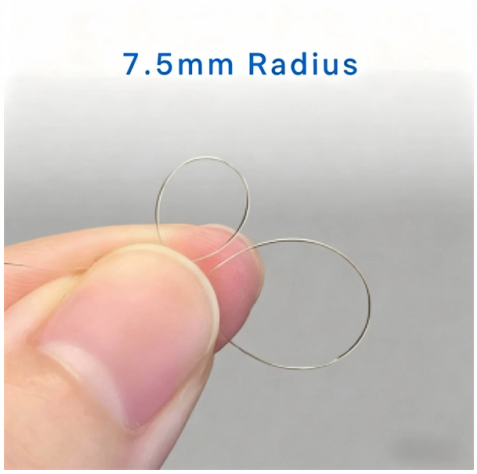
AI Dual Spectrometer



Overview

MIT researchers have developed a physics-informed generative AI tool that can predict a material's spectrum across different spectroscopy techniques – without requiring direct measurement. The rapid advent of machine learning (ML) and artificial intelligence (AI) has catalyzed major transformations in chemistry, yet the application of these methods to spectroscopic and spectrometric data–termed Spectroscopy Machine Learning (SpectraML) –remains relatively underexplored. Mass Spectrometry (Small Molecules) 2. Dubbed SpectroGen, the model generates synthetic spectral data that closely matches experimentally acquired. SpectrAI is a open-source framework bringing state-of-the-art AI to spectroscopy and spectral imaging from denoising to hyperspectral segmentation. Spectroscopy and spectral imaging underpin discoveries across biomedical research, environmental monitoring, and materials science. Today's AI-powered microspectrometers combine miniature optics, fast detector arrays, and edge compute to.

Article Content

SpectrAI — Open-Source AI for Spectroscopy

SpectrAI is a open-source framework bringing state-of-the-art AI to spectroscopy and spectral imaging from denoising to hyperspectral segmentation. Spectroscopy

AI, Deep Learning, and Machine Learning in the

Over the past two years Spectroscopy Magazine has increased our coverage of artificial intelligence (AI), deep learning (DL), and machine learning

Virtual Spectrometer Uses AI to “Measure” Samples

MIT researchers have developed a physics-informed generative AI tool that can predict a material''s spectrum across different spectroscopy techniques – without requiring direct measurement.

Simplified and economical 2D IR spectrometer design using a dual ...

Our dual AOM spectrometer uses a pump–probe beam geometry so that the emitted signal field is automatically heterodyned, which makes alignment straightforward and robust.

Photo-acoustic dual-frequency comb spectroscopy

Here, the authors show that the resolution and speed limitations in broadband photo-acoustic spectroscopy can be overcome by combining dual-comb spectroscopy with photo-acoustic

Smartphone “Dual” Spectrometer | Springer Nature Link

To this end, this chapter demonstrates a combined “dual” absorption and fluorescence spectrometer, using a low-cost nano-imprinted dispersive element. Absorption measurements are

Urban open-air chemical sensing using a mobile

Detection of airborne chemical releases in densely populated urban environments requires precise sensors with high temporal and spatial resolution

[2502.09897] Artificial Intelligence in Spectroscopy: Advancing ...

The rapid advent of machine learning (ML) and artificial intelligence (AI) has catalyzed major transformations in chemistry, yet the application of these methods to spectroscopic and

Generative AI in Spectroscopy | Springer Nature Link

Generative AI with spectroscopy is an innovative approach that combines artificial intelligence techniques with spectroscopic analysis, enabling researchers to extract valuable insights

Double Beam Spectrophotometers in UV-Vis | Agilent

Concentration Analysis of Ultra-microvolume Samples by UV-Vis Spectroscopy Fast Determination of Thermal Melt Temperature of Double-Stranded Nucleic Acids Browse the complete library of UV-Vis

AI-enabled real-time dual-comb molecular fingerprint imaging

Artificial intelligence (AI) enables real-time data reduction and imaging of gas concentration based on characteristic molecular absorption signatures. Owing to the detector array''s

AIMS-Lab-HKUSTGZ/Awesome-SpectraAI-Resources

AI methods for molecular identification and elucidation from mass spectra. Searching molecular structure databases using tandem MS data: are we there yet? This gets you all spectra but without peaks. 2.

Produktsuchmaschine für die Industrie 4.0

Kataloge Automatisierung Industrielle IT Gebäudetechnik Bildverarbeitung Schaltschrankbau Robotik Fachmagazine SPS

AI-driven ultrafast spectrometer-on-a-chip: A revolution

A newly developed silicon spectrometer-on-a-chip achieves accurate, noise-resilient hyperspectral sensing across an extended near-infrared range

A smart handheld Raman spectrometer with cloud and AI deep

Raman spectrometry has proven to be by far the most powerful noninvasive analytical technique for direct material identification. In this paper we introduce the first smart Raman device

Miniaturized spectrometers with a tunable van der

A single junction of two-dimensional van der Waal materials provides the basis for ultraminiaturized spectrometers.

Spatially resolved mass flux measurements with dual comb spectroscopy

This is the first demonstration of dual comb absorption spectroscopy (DCS) measurements of air mass flux, and the first demonstration of DCS in a hypersonic aeropropulsion environment. Our results

Recapping the Latest on Artificial Intelligence and its

An Inside Look at the Implementation of Artificial Intelligence in Surface-Enhanced Raman Spectroscopy Applications This article discusses a

High-sensitivity dual-comb and cross-comb spectroscopy across the ...

Dual-comb spectroscopy (DCS) enables high-resolution measurements at high speeds without the trade-off between resolution and update rate inherent to mechanical delay scanning.

AI and Dual-Sensor Spectroscopy Supercharge

Researchers from Chinese universities have developed an AI-powered platform that combines near-infrared (NIR) and Raman spectroscopy for

Ultra-highly sensitive dual gases detection based on ...

This study demonstrated ultra-highly sensitive dual gases detection based on photoacoustic spectroscopy by exploiting a long-wave, high-power, wide-tuning, single-longitudinal

AI-Powered Spectroscopy with Compact Spectrometers

AI-powered spectroscopy using compact spectrometers is the subject of this blog article. Compact spectrometers have already made spectroscopy portable and affordable; layering on

Dual-Functional Intelligent Spectrometer Using a Plasmonic Rainbow

Here, we report a plasmonic "rainbow" chip for dual-functional spectroscopic sensing. By analyzing a single image with deep neural network, this image-based sys.

Dual-Comb Gas Sensor Integrated with a Neural Network-Based

In general, we have developed a dual-comb spectrometer integrated with a neural network-based spectral decoupling algorithm for the simultaneous detection of a methane and water

An open-source dual-beam spectrophotometer for citizen-science-based ...

Efforts to understand and mediate threats to water supplies rely on collection of reliable data at large scale, a goal which is often limited by availability of tools that are both affordable and

Artificial Intelligence in Spectroscopy: Advancing Chemistry from ...

In this survey, we provide a unified review of SpectraML, systematically examining state-of-the-art approaches for both forward tasks (molecule-to-spectrum prediction) and inverse tasks (spectrum-to

Gas phase multicomponent detection and analysis combining

Article Open access Published: 01 August 2023 Gas phase multicomponent detection and analysis combining broadband dual-frequency comb absorption spectroscopy and deep learning

Alpha Suite Alpha Spectrometers | Radionuclide

Benchtop dual alpha spectrometer with two alpha spectroscopy channels. Each unit includes a vacuum gauge, variable detector bias supply (switchable positive or

Artificial Intelligence in Analytical Spectroscopy, Part II:

A sample library of selected references discussing the application of artificial intelligence (AI) in analytical chemistry and molecular spectroscopy is

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