

Manufacturing Process of a One-to-Two Optical Spectrometer



Article Overview

A one-to-two optical spectrometer is built by carefully designing and assembling a lens-grating-lens system that splits incoming light into two separate spectral paths, each focused onto a detector.

Design and Optical Layout

The first step in manufacturing a one-to-two spectrometer is defining the wavelength range and resolution requirements. This determines the choice of optical geometry, typically a lens-grating-lens (LGL) configuration, where a collimating lens directs light onto a diffraction grating, which disperses the light into its spectral components, and a focusing lens images the spectrum onto detectors. In a one-to-two spectrometer, the output is split into two separate paths, often using a beam splitter or dual gratings, allowing simultaneous measurement on two detectors.

Component Selection

- **Diffraction Grating:** Choose a grating with high diffraction efficiency in the target wavelength range. For example, a volume phase holographic grating with 1800 lines/mm is suitable for near-infrared applications.
- **Lenses:** Use high-quality lenses with appropriate focal lengths to collimate and focus the light. Standard 1-inch lenses in 30 mm cage systems are commonly used.
- **Detectors:** Line cameras or CCD arrays are selected based on pixel size and spectral resolution requirements. For instance, a 2048-pixel line camera with 10 μm ...

Article Content

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In industrial settings, they support critical processes such as nanoscale defect inspection in semiconductor

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Spectrometers

An optical spectrometer is an instrument for analyzing the spectral content of light. This article explains the fundamental principles

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Assembly and performance evaluation of an optical spectrometer by

In this investigation, a spectral interferometer is used as an assembly and calibration tool for an optical spectrometer.

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Optical Fiber Manufacturing Process – The 2 Main Steps

The process of optical fiber manufacturing can be specified into 2 main steps, the optical fiber preform and optical

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An insight into optical metrology in manufacturing

Optical metrology plays an important role [1, 2] in today's manufacturing industry, and many optical measurement technologies are

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Optical Spectrometers introduction

An image of the spectrum is projected onto a 1-dimensional linear detector array. Inside an Avantes optical

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Spectrometer Design Guide

On the following pages are shown two common spectrometer geometries; the transmission grating based and the crossed Czerny

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Technical Article: Spectrometer Optics and Spectrometer Design

Spectrometer Optics at Shanghai Optics Manufacturing high performance spectrometers requires highly sophisticated

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Spectrometer design guide

Understand the basic principles and formulas behind the design of a diffraction grating based spectrometer in this technical note.

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[Tutorial Series] How to Build a Spectrometer – Ansys Optics

This article describes how to implement a lens-grating-lens (LGL) spectrometer using commercially available optical elements. It

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Spectrometer Design Guide

Basically, a spectrometer is an optical system consisting of two lenses/mirrors that produces an image of the input slit on the

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How to Use a Spectrometer From Setup to Data Analysis

This analytical capability makes spectrometers valuable tools across many fields, from identifying chemical compounds in a

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How Does an Optical Spectrometer Work? A Full Analysis

Optical spectrometers are powerful tools that provide detailed insights into the properties of materials by analyzing the

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3 Optical spectrometry: principles and instrumentation

3.1 Principles Optical spectrometry is the technique of measuring the intensity of absorption or emission of radiation in the ultraviolet

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Solutions to shape the future | ZEISS

ZEISS spectrometer solutions and components are perfectly tailored to bring value to the process control

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Case study: Monitoring semiconductor processes using spectroscopy

Optical emission spectroscopy (OES), reflectance and transmission are among the spectral techniques utilised by semiconductor

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How to build a spectrometer

This article describes how to model a lens-grating-lens (LGL) spectrometer using paraxial elements, addressing the design process

Jun 08, 2026

JP5205242B2

G01J3/024 — Optical elements not provided otherwise, e.g. optical manifolds, diffusers, windows using means for illuminating a slit

Jun 05, 2026

An Introduction to a Spectrometer

Explore the integration of slits, gratings, and detectors in spectrometers, focusing on common optical bench designs

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METHOD FOR MANUFACTURING SPECTROMETER

Technical Field The present invention relates to a method for manufacturing a spectrometer which spectrally resolves and

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How to build a spectrometer

Spectroscopy is a non-invasive technique and one of the most powerful tools available to study tissues, plasmas and materials. This

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A Comprehensive Review of Optical Metrology and Perception ...

Optical metrology and perception technologies employ light as an information carrier to enable non-contact, high

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Make or Buy Your Spectrometer

Buy an off-the-shelf standard product from a spectrometer supplier Out-source development and manufacturing to a spectrometer

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Designing a custom spectrometer

We work then to design and manufacture the optical and electronic parts, develop the firmware and software for data

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Design and implementation of a high-resolution, high-efficiency optical ...

We present the design, implementation and testing of a high-efficiency, high-resolution transmission grating

Sep 18, 2025

DLP Spectrometer Design Considerations

The type and complexity of this processing is different depending on the encoding scheme (scanning column of mirrors, Hadamard

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Miniature integrated spectrometers towards high-performance and

This design balances high-performance and low-cost manufacturing of an on-chip spectrometer by integrating low-cost solution

Oct 15, 2025

Automated optical inspection

Automated optical inspection (AOI) is an automated visual inspection of printed circuit board (PCB) (or LCD, transistor) manufacture

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Fabricating a Raman spectrometer using an optical pickup unit and ...

Thus, this study focused on the structural similarity between the Raman spectrometer and an optical pickup unit

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Spectrometer Optics and Spectrometer Design

Spectrometer Optics at Shanghai Optics Manufacturing high performance spectrometers requires highly sophisticated production

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How to Design a Spectrometer

My graduate advisor, Professor John P. Walters, who had designed (or worked with others to design) several

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A Review of Optical Metrology Techniques for Advanced

By integrating these approaches, optical metrology is shown to play a central role in bridging macroscopic and nano

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Optical Diffraction Gratings for Spectroscopic Instruments

Optical design and manufacturing technology of optical gratings The optical design of periodic grat-ing structures is widely done by

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