EMAC 276

Lecture 17: The Importance of Standardization
The Importance of Patents

February 28, 2025

Andy Olah, Ph.D.; amo5@case.edu

The Importance of Standardization

What's the Difference Between an Oil, a Wax and a Polymer?

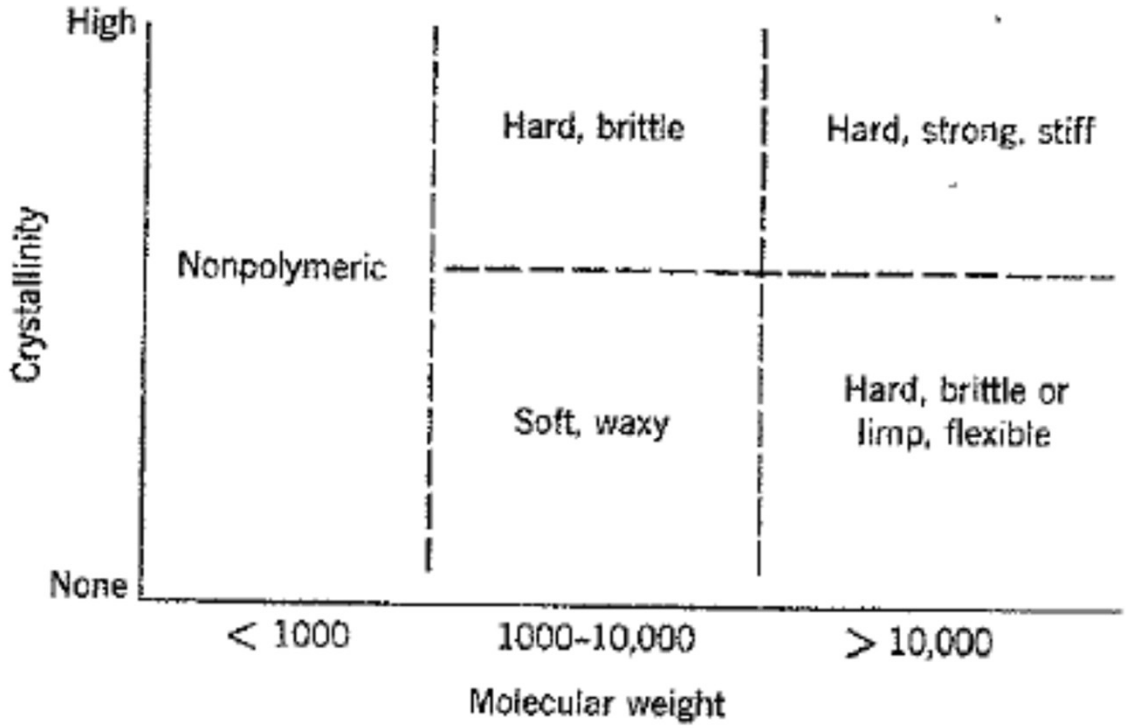


Fig. 1-3. Classification of the expected properties of materials on the basis of molecular weight and crystallinity.

What's the Difference Between an Oil, a Wax and a Polymer?

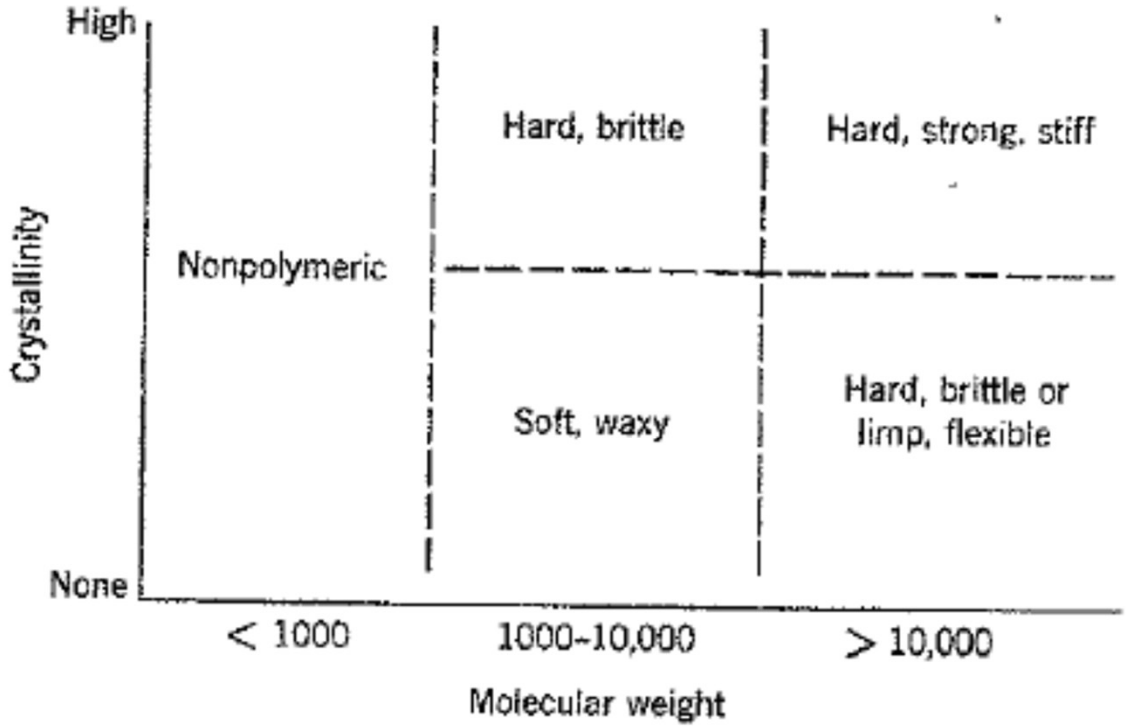


Fig. 1-3. Classification of the expected properties of materials on the basis of molecular weight and crystallinity.

Answer: Molecular Weight. Remember polyethylene and polydimethylsiloxane.

On August 27, 1859, Drake Struck Oil in Pennsylvania

Western Pennsylvania and Eastern Ohio were original locations for the early production of crude oils.

Edwin Drake

BTW: Melrose, in Nacogdoches County, was the site in 1866 of the first drilled well to produce oil in Texas.

Pennsylvania Based Crude Oils were High in Paraffin Content

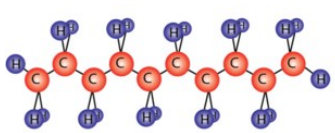
Element	Weight %
Carbon	83-87
Hydrogen	10-14
Nitrogen	0.1-2
Oxygen	0.1-1.5
Sulfur	0.5-6
Metals	< 0.1

Hydrocarbon	Weight %
Paraffins	30
Naphthenes	49
Aromatics	15
Asphaltics	6

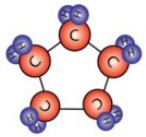
The hydrocarbon weight % values are averages.

Does not hold true today since most motor oils are multiblends.

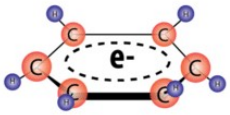
Basic Composition of Crude OIl



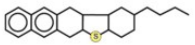
Paraffin



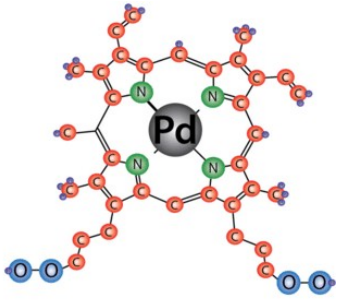
Naphthene



Aromatic



Resin



Asphaltene

PROPERTIES OF HEAVY CRUDE OILS

- Heavy crude oil is asphaltic. It is "heavy" (dense and viscous).
- heavy crude oils with a high content of naphthenic compounds, such as asphaltenes.
- Asphaltic crude oils are also known as naphthene-based crude oil when the paraffin wax content is low (< 10%)
- Heavy oil has over 60 carbon atoms and hence a high boiling point and molecular weight.

Oil Lamps and Lamp Oil

Oils that were commonly used in lamps:

- Vegetable oil
- Olive oil
- Corn oil
- Sunflower Oil
- Mustard Seed Oil
- Whale Oil
- Petroleum Based - Kerosene

The quality of oils from different companies varied, some didn't light, others were sooty, and still others nearly exploded when lit.

One Man Marketed an Oil that was Very Uniform in Performance

Being invested in the newly discovered crude oil production in Pennsylvania and Ohio he utilized these high paraffinic content oils to produce a high quality lamp oil that wasn't sooty and was consistent in performance.

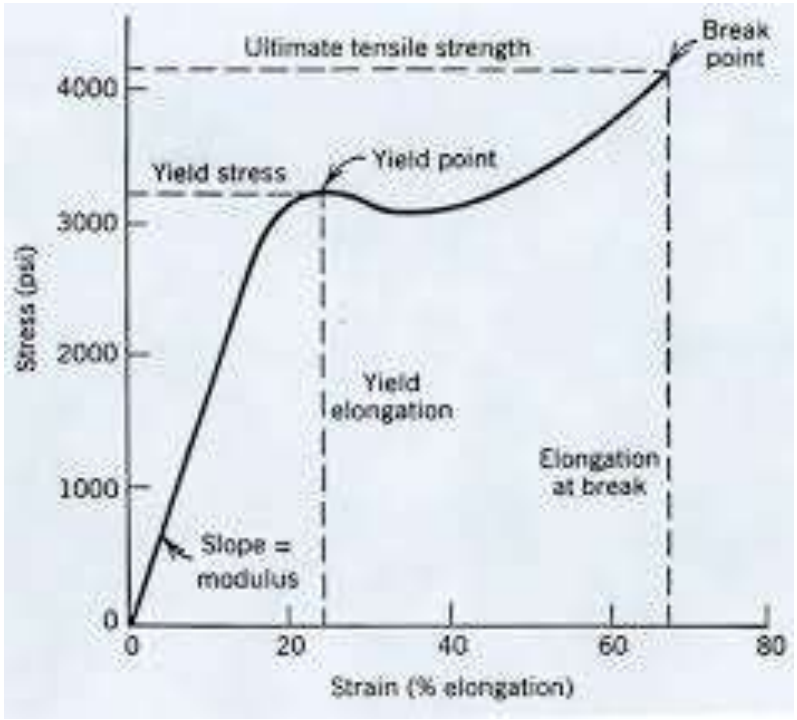
In order to represent the performance and consistency of this ***oil in 1870 he decided to call his company the Standard Oil Company***.

This man was John D. Rockefeller, and he started this company in Cleveland, Ohio.

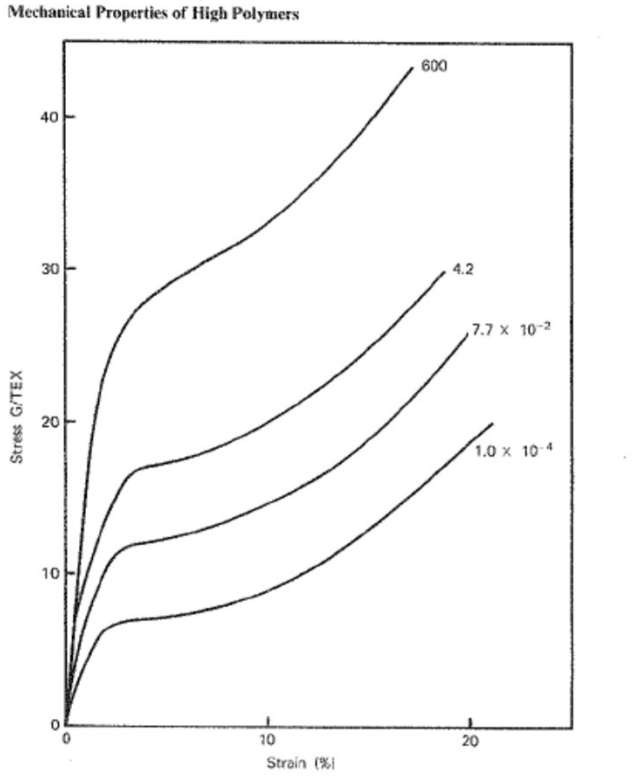
J.D. Rockefeller recognized the importance of standardization of quality in the marketing of a product.

Why Develop Standards?

Use the simple stress-strain curve for a polymer as an example.



A lot of information can be obtained from a single stress-strain curve.



27 Effect of strain rate on tensile stress-strain curves of polyacrylonitrile (77). Tex = weight in grams of 1000 m of yarn. G = applied force/g.

It can differ relative to strain rate.

Use the simple stress-strain curve for a polymer as an example.

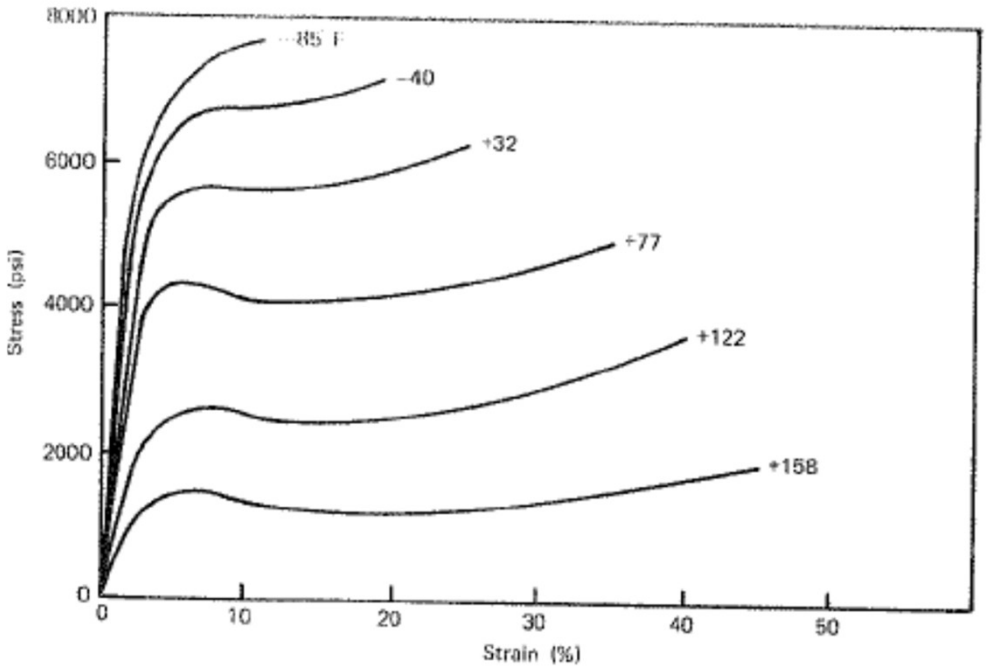


Figure 29 Effect of temperature on tensile stress–strain curves of cellulose acetate (20).

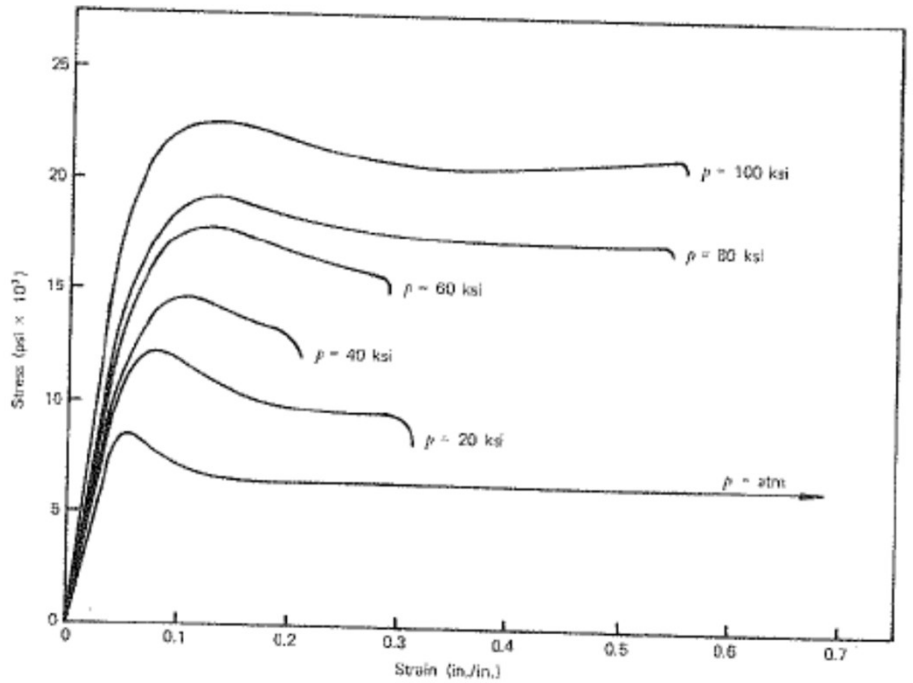


Figure 30 Effect of pressure on tensile stress–strain curves of polyvinyl chloride.

It can differ relative to temperature.

It can differ relative to pressure.

Without Standardization

- Lab-to-Lab Variation and Characterization
  - Sample Geometry
  - Sample Preparation and Conditioning
  - Sample Testing
  - Data Reporting
- Misrepresentation of Performance
- Reporting Deficiencies and Inconsistencies
- Harmonization of Testing around the World

Designation: D638 – 14

Standard Test Method for Tensile Properties of Plastics[1]

DOW™ HDPE DMDA-8920 HEALTH+™ Technical Data Sheet

Additive • Antiblock: No • Slip: No • Processing Aid: No

Physical	Nominal Value (English)		Nominal Value (SI)		Test Method
Density	0.954	g/cm³	0.954	g/cm³	ASTM D792
Base Density [1]	0.954	g/cm³	0.954	g/cm³	Dow Method
Melt Index (190°C/2.16 kg)	20	g/10 min	20	g/10 min	ASTM D1238
Environmental Stress-Cracking Resistance (ESCR)					ASTM D1693
122°F (50°C), 100% Igepal, F50	3.00	hr	3.00	hr	
Mechanical	**Nominal Value (English)**		**Nominal Value (SI)**		**Test Method**
Tensile Strength					ASTM D638
Yield	4100	psi	28.3	MPa	
Break	2000	psi	13.8	MPa	
Tensile Elongation					ASTM D638
Yield	7.0	%	7.0	%	
Break	250	%	250	%	
Flexural Modulus - 2% Secant	167000	psi	1150	MPa	ASTM D790B
Impact	**Nominal Value (English)**		**Nominal Value (SI)**		**Test Method**
Tensile Impact Strength [2]	20.0	ft-lb/in²	42.0	kJ/m²	ASTM D1822
Hardness	**Nominal Value (English)**		**Nominal Value (SI)**		**Test Method**
Durometer Hardness (Shore D)	57		57		ASTM D2240
Thermal	**Nominal Value (English)**		**Nominal Value (SI)**		**Test Method**
Deflection Temperature Under Load					ASTM D648
66 psi (0.45 MPa), Unannealed	163	°F	72.8	°C	
Brittleness Temperature	< -105	°F	< -76.1	°C	ASTM D746
Vicat Softening Temperature	261	°F	127	°C	ASTM D1525
Melting Temperature (DSC)	266	°F	130	°C	Dow Method
Peak Crystallization Temperature (DSC)	243	°F	117	°C	Dow Method

Additional Information

Plaque molded and tested in accordance with ASTM D4976.

Global Standard Organizations

- ISO - International
- CEN – European Community
- ASTM – North American*
- CSA – Canadian
- GB – China (PRC)
- BIS – India
- NSF – Drinking Water Systems (N. America)*
- UL – Fire Protection*

* Currently active

- Harmonization – Correspondence (similarity) of standards between different standard organizations; i.e., ASTM and ISO.

How to Develop or Change an ASTM Standard

- Take out a project obtaining a project number (WK #). Get Sub-committee Chairman's approval.
- Assemble a Task Group with other member having common interest.
- Develop a "draft" for balloting.
- Ballot to Subcommittee only
  - If any Negative Vote is received resolve Negative and reballot to Subcommittee.
  - If No Negative Votes are received move draft up for a Main Committee Ballot.
  - If any Negative Vote is received resolve Negative and reballot to Main Committee.
- When no further Negative Votes are received project undergo's Standards review, Editorial review and becomes a formal new standard or modification to an existing standard.

Terminology

- Consensus Process – The standard development, change and renewal process requires the full approval of all members on the committee.
  - The ASTM process is the only full consensus process today.
    - All others are by a simple majority vote or 2/3 vote.
    - Any one “negative” vote will stop the ASTM process.
  - ASTM “Negative” handling.
    - Incorporate the “negative” concern and ballot again.
    - Get the negative voter to withdraw negative vote.
    - Take the “Negative” to Sub and Main committee in full session (Meets two times/year).
      - Find “Persuasive” – Must change document.
      - Find “Non-Persuasive” – Negative fails.
      - Find “Non-Related” – Negative fails.
    - Ballot the “Negative” to full committee by letter ballot.
- Hard Language (must, shall, etc.) vs Soft Language (can, could, may, etc.)

Current ASTM Committees – Full Vote

D 20 – Plastics

F 17 – Plastic Piping Systems

Chairman for 25 years F 17.25: Vinyl Pipe Subcommittee

E 5 – Fire Protection and Safety Standards

E 60 – Sustainability

As a “Fellow” of the ASTM Society, I have been requested to assist in a brand new committee:

Current ASTM Committees – Full Vote

D 20 – Plastics

F 17 – Plastic Piping Systems

Chairman for 20 years F 17.25: Vinyl Pipe Subcommittee

E 5 – Fire Protection and Safety Standards

E 60 – Sustainability

As a “Fellow” of the ASTM Society, I have been requested to assist in a brand new committee:

D 37 - Cannabis

I highly recommend students become active in ASTM. There is a benefit to become involved early.
Visit: astm.org and type in “Student Membership” in search box.

The Importance of Patents

Why Patent?

Protect against copying

You will need to share your concepts with investors and other partners so that you can get your idea to the market. By having a provisional patent, no one will be able to steal your idea or concept.

Protect the company's ability to do business

If you don't patent your invention, someone will copy it and enter the market with your product. So, you will have competition in the market. You may also lose the right to compete if that person files a patent for the product.

Increase market position

If you have a patent portfolio, you will increase the market position by preventing other companies from competing in your specific niche.

Get licensing fees

You may not be able to commercialize your concept finally. But there might be others who have resources to turn your idea into a commercial commodity. Your company can then get licensing fees for using your concept.

Improves CV

If you have a patent portfolio, it shows that you have a technical expertise and the commitment to inventing something. Investors and partners will appreciate it and might want to work with you.

Basic Steps for Obtaining a Patent

Step 1: Determine the type of Intellectual Property protection that you need: Trademark, Copyright, Patent, etc.

Step 2: Determine if your invention is patentable:

Search to see if your invention has already been publicly disclosed.

Step 3: Get ready to apply: By Yourself or Outside Legal Help

There will be fees: filing, search and examination fees

Step 4: Prepare and submit your initial application

Step 5: Work with your examiner

There may be additional fees: examiner, extension of time, etc.

Step 6: Receive your approval

There will be additional fees: publishing and over time maintenance fees.

Basic Terminology

What is “Prior Art”:

Anything in the Public Domain that describes your Invention, such as:

1. Another invention
2. A published scholarly article
3. A device or product already marketed (US 72X, 3-14-1794)
4. A disclosed manufacturing practice
5. A presentation that has been recorded in some manner

When are you formally protected to discuss your invention?

Only when you have formally filed your invention application with the patent office (USPTO) and have an application number and filing date may you then discuss your invention/idea/etc.
NOTE: You are protected based on your filing date.

Claims – The most important part of a patent

4. CLAIMS

The most important part of the patent is the claims; the claims set forth and define the patent's scope of exclusive rights. In other words, they describe what the patent does or does not cover. Each claim element should be shown in the drawings and described in the detailed description.

There are two different ways to categorize the types of claims you'll find in a typical patent.

INDEPENDENT VS. DEPENDENT CLAIMS

Another way to categorize claims is independent claims versus dependent claims. As the names suggest, each independent claim stands on its own, whereas dependent claims always refer back to (and "depend" from) another claim.

INFORMATION CONTAINED WITHIN A PATENT

Broadly, the typical patent consists of four main parts:

1. Front page(s)
2. Drawings
3. Specification
    1. A background section
    2. A list of drawings
    3. A detailed description
4. Claims

The specification may also include the following other sections, though these are generally not required:

- A summary section
- A cross-reference to related applications
- A statement of government support

WHAT A PATENT WON'T TELL YOU

:

- Have the maintenance fees been paid?
- Has the patent expired?
- Who is the current owner of the patent?
- Has the patent been invalidated, enforced, licensed, or sold?
- Have any further applications (like continuations or divisionals) been filed for this subject matter after this patent was granted?

www.patents.google.com

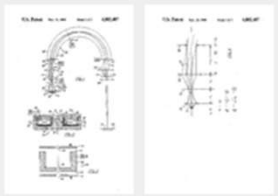
Google Patents | us 4,882,487

Direct imaging monochromatic electron microscope

Abstract

A direct-imaging, monochromatic electron microscope includes an objective lens for collecting a substantial portion of emitted electrons from an area across a sample surface, and focusing the electrons through an image plane. A collimating lens for collimating the electrons into beams is located at its focal distance from the image plane. An energy filter with an entrance aperture is receptive of the beams to transit monochromatic beams, and a transfer lens is receptive of the monochromatic beams for refocusing the same through a projection lens to effect an image of the plurality of spots in a projection plane. The objective lens is formed of a magnetic toroidal coil having a central hole therein with a dish-shaped magnetically permeable member cupped coaxially over the toroidal coil. The permeable member has a neck portion protruding through the central hole. The sample surface is interposed proximate the objective lens between the objective lens and the energy filter. The entrance aperture is positioned from the transfer lens by approximately a distance optically conjugate to the distance between the objective lens and the collimating lens.

Images (2)



Classifications

H01J37/26 Electron or ion microscopes; Electron or ion diffraction tubes

US4882487A
United States

Download PDF | Find Prior Art | Similar

Inventor: Robert L. Gerlach

Current Assignee : Applied Biosystems Inc , Nova Measuring Instruments Inc , First Bank NA

Worldwide applications

1988 • ~~US~~

Application US07/268,440 events

1988-11-08	• Application filed by Perkin Elmer Corp
1988-11-08	• Priority to US07/268,440
1989-11-21	• Application granted
1989-11-21	• Publication of US4882487A
2007-06-05	• Anticipated expiration
Status	• Expired - Lifetime

Show all events

United States Patent [19]

Gerlach

[11] **Patent Number: 4,882,487**

[45] **Date of Patent: Nov. 21, 1989**

[54] **DIRECT IMAGING MONOCHROMATIC ELECTRON MICROSCOPE**

[75] Inventor: **Robert L. Gerlach**, Minnetonka, Minn.

[73] Assignee: **The Perkin-Elmer Corporation**, Norwalk, Conn.

[21] Appl. No.: **268,440**

[22] Filed: **Nov. 8, 1988**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 58,437, Jun. 5, 1987, Pat. No. 4,810,880.

[51] **Int. Cl.**[4] **H01J 37/285**

[52] **U.S. Cl.** **250/306**; 250/305; 250/310

[58] **Field of Search** 250/306, 305, 307, 310

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,758,723	7/1988	Wardell et al.	250/307
4,810,880	3/1989	Gerlach	250/305

OTHER PUBLICATIONS

Wincott et al., J. Phys. E: Sci. Instrum. 22 (1989) pp. 42–47.

Primary Examiner—Jack I. Berman

Attorney, Agent, or Firm—E. T. Grimes; H. S. Ingham

[57] **ABSTRACT**

A direct-imaging, monochromatic electron microscope includes an objective lens for collecting a substantial portion of emitted electrons from an area across a sample surface, and focusing the electrons through an image plane. A collimating lens for collimating the electrons into beams is located at its focal distance from the image plane. An energy filter with an entrance aperture is receptive of the beams to transit monochromatic beams, and a transfer lens is receptive of the monochromatic beams for refocusing the same through a projection lens to effect an image of the plurality of spots in a projection plane. The objective lens is formed of a magnetic toroidal coil having a central hole therein with a dish-shaped magnetically permeable member cupped coaxially over the toroidal coil. The permeable member has a neck portion protruding through the central hole. The sample surface is interposed proximate the objective lens between the objective lens and the energy filter. The entrance aperture is positioned from the transfer lens by approximately a distance optically conjugate to the distance between the objective lens and the collimating lens.

9 Claims, 2 Drawing Sheets

Independent Claims vs Dependent Claims

or

Main Claims vs Sub Claims

plurality of spots generally will approach a continuum. However, it may be desirable to collect all electrons from the entire area of the multiplier **108** in order to analyze the entire surface area with a high intensity beam resulting in a high total signal. Alternatively the energy source **16**, such as an electron beam, may be focused into a spot on the surface and, for example, may be scanned over the surface in a scanning mode. In either event, the microscope of the present invention is advantageously utilized as an analysis device without direct imaging, with high collection efficiency and, therefore, sensitivity.

While the invention has been described above in detail with reference to specific embodiments, various changes and modifications which fall within the spirit of the invention and scope of the appended claims will become apparent to those skilled in this art. The invention is therefore only intended to be limited by the appended claims or their equivalents.

What is claimed is:

1. A direct imaging, monochromatic electron microscope comprising emitting means for emitting electrons from a plurality of spots on a sample surface, objective lens means for collecting a substantial portion of the emitted electrons and focusing the same at an image plane, collimating lens means for collimating the substantial portion of the emitted electrons into beams, an energy filter having an entrance aperture receptive of the beams to transit monochromatic beams having a selected energy, imaging means receptive of the monochromatic beams for focusing the same to effect an image of the spots, and detector means for detecting the image, the objective lens means having a first effective position plane, the collimating lens means having a second effective position plane and a focal length relative to the second plane, the second plane being positioned at a first distance from the image plane equal to the focal length and at a second distance from the first plane, and the entrance aperture being positioned from the second plane by approximately a third distance optically conjugate to the second distance with respect to the second plane of the collimating lens means.

2. An electron microscope according to claim **1** wherein the objective lens means includes a magnetic objective lens.

3. An electron microscope according to claim **2** wherein the objective lens means comprises a magnetic field generating toroidal coil and a dish-shaped magnetically permeable member cupped coaxially over the toroidal coil.

4. An electron microscope according to claim **3** wherein the coil has a central hole therein and the permeable member has a neck portion extending substantially through the central hole.

5. An electron microscope according to claim **1** wherein the objective lens means is situated to collect the substantial portion of the emitted electrons from a sample surface interposed between the objective lens and the energy filter proximate the objective lens.

6. An electron microscope according to claim **1** wherein the energy filter comprises a spherical analyzer of hemispherical configuration with a slotted exit aperture located diametrically opposite the entrance aperture.

7. An electron microscope according to claim **1** further comprising means for selecting the energy for the monochromatic electron beams.

8. An electron microscope according to claim **1** wherein the emitting means comprises an electron gun directed at the sample surface to cause Auger electron emission from the sample surface.

9. An electron microscope according to claim **1** wherein the emitting means comprises an X-ray source directed at the sample surface to cause photoelectron emission from the sample surface.

* * * * *

Provisional vs Non-provisional Application

A provisional application is a quick and inexpensive way for inventors to establish a U.S. filing date for their invention which can be claimed in a later filed nonprovisional application.

A **provisional patent application** will never get a patent issued for your invention. It only lasts for one year and gives the inventor an opportunity to conduct more research or finish the invention before filing a non-provisional patent application. A provisional patent application also costs a lot less to file.

From the day you file, you will have a year to convert your provisional application. Conversion involves filing a non-provisional patent application that includes a reference to your provisional patent application. In that way, a good provisional patent definition is a placeholder. It holds a place in line for your future non-provisional application.

Provisional vs Non-provisional Application

The provisional only holds the line for the invention as you described it in your provisional application. Anything new that goes into your non-provisional application will have to go to the back of the line.

What is a Non-Provisional Patent?
If a provisional patent application is simple, informal and quick to file then a non-provisional patent is the opposite: long, complicated and difficult to file. The non-provisional application form is very long. It contains many parts and the parts have many rules.

Unlike a provisional patent application, a non-provisional patent can issue into an enforceable claims. Your invention is only protected once your non-provisional patent is issued by the United States Patent and Trademark Office (USPTO). Then, if anyone tries to produce a similar product they are infringing your patent.

Which one Should You File? . . . File both. But don't write too specifically (i.e., preferred, more preferred, most preferred).

EMAC 276 – Homework
Assignment #3 – *Dr. Olah*
Due: Friday, March 21, 2025

We have reviewed the patent search engine "patents.google.com", illustrating how patents can be found and pertinent aspects of those patents can be obtained.

I. Your assignment is to look up US 4,234,204 and list the following: (1 Point Each)

a. Item invented:

b. Filing date and Issue date:

c. Inventor(s):

d. Number of Main (Independent) claims:

e. Number of Sub (dependent) claims:

II. Also, look up the following patents and list only the: a) inventor(s), b) date issued, and c) the item invented. (1 Point Each)

a. US 223,898
b. US 174,465
c. US 821,393
d. US 1,773,980
e. US 3,501,586

III. (X-tra Credit, 1 Point) What was the patent object, the date, and inventor for patent US X72

Lecture 19: The Importance of Standardization
The Importance of Patents

Questions?

Dr. Andy Olah, amo5@case.edu, O: 216-368-0606, C: 216-272-0505

"Regular naps prevent old age, especially if you take them while driving. "