

Iowa State University Library
Materials Science Collection Development Policy

I. General Purpose

“Put simply, materials are the stuff from which all things are made, be they mundane household utensils or sophisticated integrated circuits that drive all of our modern technological society. Materials science and engineering is thus a key enabling technology on which all other technologies depend. Modern materials can be broadly grouped into metals, ceramics, polymeric materials (plastics), electronic materials, and composite materials (combinations of other types).”¹

II. History

A two-year program in Clay Working was first offered in 1899. At that time, ceramic engineering was tied to mining engineering, which was in turn a part of the Department of Geology. The Department of Ceramics in the Division of Engineering was not established until 1906. The two-year program was continued and a four-year program in Ceramics was offered. In 1911, the two-year program was eliminated. Work for the M.S. degree was added in 1915. The name of the department was changed to the Department of Ceramic Engineering in 1918. Work for the Ph.D. degree was initiated in 1947. Major work for the M.S. and Ph.D. Degrees in Metallurgy was first offered in 1953. It was organized on an interdepartmental basis under the direction of an Administrative Committee. This program involved the Departments of Chemical Engineering, Chemistry, Mechanical Engineering, and Physics. In 1961, the Department of Metallurgy was formally established. Graduate work was continued and undergraduate work was added. The Department of Materials Science and Engineering was formed in 1975 by the merger of the previously existing Departments of Ceramic Engineering and Metallurgy.

A detailed history of the department can be found on the Internet at:
<http://mse.iastate.edu/information/History/History.html>

III. Iowa State University Program

In 1996, M.S. and Ph.D. degrees in Ceramic Engineering and Metallurgy were discontinued and new M.S. and Ph.D. degrees in Materials Science and Engineering were started. Finally, in 1998, the B.S. degrees in Ceramic Engineering and Metallurgical Engineering were discontinued and a single B.S. degree in Materials Engineering was started. For the latter degree, undergraduate students select two specializations among the areas of Ceramic Engineering, Metallurgical Engineering, Polymer Engineering, and Electronic Materials. Current enrollment in the undergraduate program is around 100 students and in the graduate program around 60 students.

Annual research expenditures of the MSE Department are approximately \$9M/yr, which is the highest among the departments in the College of Engineering, and is among the highest for comparable departments in the nation. The results of this research are approximately 125 scholarly publications per year, over 100 patents by faculty members, and two prestigious R&D-100 Awards in the last several years.

¹ Definition taken from the Department of Materials Science and Engineering web page.

IV. Subject Boundaries

The library collections in ceramics and metallurgy are fairly comprehensive due to the long history of these program at ISU. Other areas of materials science are much less extensive in the collections and need more development.

V. General Collection Guidelines

- A. Linguistic. English language materials are primarily collection, with some additional materials in French and German languages.
- B. Geographical Areas. Research conducted worldwide is of interest.
- C. Types of Materials Collected. Books, journals, and technical reports are the bulk of the collection. No patents are purchased – these are requested on Interlibrary Loan or accessed via the Internet.
- D. Format of Materials Collected. Mostly paper format; some microfiche/microfilm for technical reports; some CD-ROM software accompanying books.

VI. Specific Collection Guidelines

There are several society and association presses that are especially important to materials science collection development. Most of the publications of the Materials Research Society and the American Ceramics Society are purchased via standing orders or serial subscriptions. The Minerals, Metals, and Materials Society (TMS) catalogs need careful scrutiny for book purchases as do those of the ASM International. Both of these groups are part of the Yankee approval plan; however, new editions and volumes in a series are often not sent as part of the approval plan. In addition, there is a plethora of small specialized society catalogs that regularly have relevant materials science publications.

The recent hiring of Professors Tsukruk and O'Taigbe shows a new emphasis on polymeric materials. Some book purchasing has been done to support this area, but nothing has been done yet to enhance the journal collection to support polymer research needs (due to lack of available funding). More recent hires in the area of electronic materials suggest that area will grow as well and collections need to be added in this area also.

Research materials dealing with nondestructive evaluation, phase diagrams, MSDS, and the scanning electron microscope are especially important to materials scientists.

VII. Detailed Subject Areas

The Department has distinguished professors who specialize in: metallurgy of rare earths (Karl Gschneidner), nondestructive evaluation (R. Bruce Thompson), solidification microstructures (Rohit Trivedi) and phase transformation control in metallic systems (John Verhoeven). The Department also has a member of the prestigious National Academy of Sciences (Vladimir Tsukruk) who specializes in microstructure analysis of polymeric materials. The current department chair specializes in ceramic processing. Other faculty are active in glass research, photonic materials, electronic materials, physical metallurgy, powder metallurgy, and chemical metallurgy.

The Materials Preparation Center in the Metals Development Building of the Ames Laboratory conducts research in metals and alloy design (especially rare earths), ultrafine microstructures, as well as high strength and high conductivity of materials.

The Scanning Electron Microscope is especially important to materials science and information about the facility can be found at:

<http://mse.iastate.edu/information/SEMart.html>

VIII. Other Resources Available

There is currently a web page to assist in locating "Materials Science Resources on the Web" at:

<http://www.lib.iastate.edu/scholar/bib/matsci.html>

IX. Cross-references to Collection Policies

Chemical Engineering

Chemistry

Physics

X. Creation date: 9/28/99

XI. Revision History: last revised 8/7/00

XII. LC Class(es), if applicable.

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| TA 401-492 | Mechanics of Materials |
| TA 1501-1820 | Applied Optics. Photonics. |
| TN 600-799 | Metallurgy |
| TP 785-869 | Clay industries. Ceramics. Glass. |
| TP 1080-1185 | Polymers and polymer manufacture |
| TS 220-770 | Metals Manufactures. Metalworking. |

XIII. Bibliographer name: Lorrie Knox