

2982 THE INSTITUTE OF PAPER CHEMISTRY
(Synthetic Fiber Survey)
Project Reports

Institute of Paper Science and Technology
Central Files

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by William C. Krueger, Project Leader

DIVISION: Natural Materials and Systems

DATE: August 2, 1977

✓ PROJECT NO.: 2982 - Plastic and Synthetic Paper

Class: FE

OBJECTIVE:

To maintain an awareness, at a minimum level, of developments in the field of plastic and synthetic paper and also plastic pulp. It has recently been expanded to include a collection of synthetic fibers.

BUDGET:**SCHEDULE:**

On a time available basis or as specific needs arise.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

We have been receiving the computer printout with abstracts monthly on the subject and are keeping for reference as needed.

Requests for synthetic fiber samples to be used as knowns for identification have been initiated.

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by William C. Krueger, Project Leader

DIVISION: Division of Natural Materials & Systems

DATE: April 14, 1977

✓ PROJECT NO.: 2982 "Survey of Synthetic Fiber"

Class: FE

OBJECTIVE: Maintain awareness of developments on synthetic and plastic paper and plastic pulp.

BUDGET: \$1,200-\$1,500

SCHEDULE: To be carried out on routine basis as time available.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

Have been getting computer output on subject monthly for last 4 months.
Plan to submit report or "review" as appropriate from time to time.

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by William C. Krueger, Project Leader

DIVISION: Natural Materials and Systems

DATE: January 7, 1977

PROJECT NO.: 2982 "Awareness of Synthetic and Plastic Paper Developments"
Class: FE

OBJECTIVE:

To maintain a minimum awareness of developments in the field of plastic and synthetic papers as developments occur.

BUDGET:

\$2,500 (?)

SCHEDULE:

Minimum level of activity at present controlled by developments in the field. No concerted effort anticipated at this time.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

To date have been reviewing literature and obtaining samples as time available. Continue to maintain on minimum level.

PROJECT REPORT FORM

Copies to: Central Records
John W. Swanson
William C. Krueger (2)

✓ PROJECT NO. 2982
COOPERATOR Institute of Paper Chemistry
REPORT NO. X2
DATE November 2, 1976
NOTEBOOK none PAGE
SIGNED *William C. Krueger*
William C. Krueger

SURVEY OF SYNTHETIC FIBER AND OTHER
NONCONVENTIONAL PRINTING SUBSTRATES

INTRODUCTION

When this project was established several years ago, the purpose was to serve as a "coproject", with a classified sponsored project. At the time there was no one project at The Institute of Paper Chemistry that was concerned with the rather broad, developing field of synthetic and plastic paper. The specific intent in establishing the program was to serve as a mechanism for filing information that was not subject to the restrictions of the sponsored project. As of October 1, 1976 the sponsored interest in this field has been terminated.

BACKGROUND

Although there has been some research activity prior to 1960, the first real commercial paper utilizing various synthetic fibers was developed in the early 1960's in Switzerland. This product was an interesting material composed of mixtures of synthetic fibers with conventional papermaking fibers. About 1969 development work in the field was accelerated by official edict in Japan. There was considerable government pressure to develop a technical and economical viable product. This was dictated by Japan's rather vulnerable position in obtaining natural fibers for the production of paper. The early efforts in Japan were somewhat limited to the development of a polymeric film-type product.

In the United States, Union Carbide was developing similar film-type products. In the 1960's, Du Pont was also actively engaged in developing the spunbonded technology, which they pioneered.

The field of synthetic pulp technology was also developing, led again by the Japanese.

About 1968 some economists were predicting 90,000 tons production by 1973 and 750,000 tons by 1978. Actual production will be far below these figures and will only reach about one percent of the projections. Needless to say, the somewhat recent oil embargo of past years by the OPEC nations curtailed production plans considerably because of its impact on the petrochemical field. Cost factors also did not favorably develop as many had predicted. The selling prices of pulp and paper did increase but not at the projected rate. Meanwhile the manufacturing costs of many of the polymer products that had been developed and commercialized did not decrease as projected and, in fact, the cost of raw materials increased.

Many companies (especially Japanese) established semicommercial or commercial production facilities only to fail because of lack of a market. The so-called large tonnage markets just have not materialized as many had hoped and predicted.

DISCUSSION

The field of plastic and synthetic paper has consisted of a variety of processes and polymers used. The following are some of the more significant types of processing.

1. Synthetic Fiber/Wood Pulp Combinations

This method has and still consists of combinations of a variety of synthetic fibers either alone or with wood fiber. These products have reached some commercial significance in Europe as specialty papers. They have also entered the field of nonwovens or disposable materials. The growth in the latter area has been more rapid than in the paper field.

2. Film Base Materials

These materials were films utilizing varied polymeric materials and processes. One of the major problems encountered was the printability of these films. Various surface treatments were utilized including coating, solvent treatment, corona discharge, and others. Some of the films were filled with various fillers to improve their surface properties.

3. Foamed Sheet

This process involved the production of a foamed sheet substrate. This material has not found much success in the printing grades and only a limited amount of use in the packaging trade.

4. Spunbonded

This technology has probably shown the greatest market growth potential in the U.S.A. The manufacturer (Du Pont) not only markets various grades or types of this material for use "as is" or to several companies who apply various types of coatings before marketing. The basic spunbonded material (Tyvek) has also achieved some degree of success in the "low cost" clothing market. Ascot (produced by the Appleton Papers Division of NCR) has probably achieved the most success in the coated spunbonded substrate market.

5. Plastic Pulp

As the name implies, this technology involves the production of a pulplike polymeric fiber to be used as a partial replacement with conventional wood fiber. Crown Zellerbach has been the prime promoter of this product (SWP - Synthetic Wood Pulp) in the U.S.A. Although meaningful production or marketing figures are not readily available, it would appear that further growth would have to be promoted to achieve a product having significant economic impact on the pulp or paper marketing picture.

CONCLUSIONS

During the past ten years there has been considerable research and development in this field. Only a very limited number of products have achieved significant marketing acceptance. Those products that have developed significant market interest have been in the packaging field (bags, envelopes, etc.,) some specialized printing markets, and in the nonwoven or disposables. In some areas one would find it difficult to delineate between a so-called paper replacement and new products in the plastics industry.

The closest products utilizing a significant amount of papermaking technology has been the utilization of synthetic fibers and the plastic pulps in combination with wood fibers.

The number of paper producers or convertors engaged in the product of synthetic or plastic papers is still limited. It would appear that there would have to be some very drastic change in the papermaking economic picture before synthetic or plastic papers can truly be considered to be of broad-based significance.

SUGGESTIONS FOR FUTURE WORK

In the near future a new proposal will be written for the extension of this program. In brief it is suggested this program be continued as outlined in the proposal with the changes indicated.

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by: William C. Krueger, Project Leader

DIVISION: Natural Materials and Systems

DATE: October 4, 1976

PROJECT NO.: 2982 - Synthetic Papers

Class: FE

OBJECTIVE: Awareness of plastic and synthetic papers and related materials.

BUDGET:

7/1 - 1/31/76 \$5,000 = 3,000 15'

SCHEDULE: On a fill in basis.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

It is suggested this program be reviewed in line with its relationship with Project 1744 interests.

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by William C. Krueger

DIVISION: Natural Materials and Systems

DATE: June 30, 1976

✓ PROJECT NO.: 2982 -- Synthetic & Plastic Paper

Class: FE

OBJECTIVE:

Maintain awareness of synthetic and plastic paper developments.
Works jointly with part of Project 1744.

BUDGET:

Do not know.

SCHEDULE:

Routine basis; minimum level of activity.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

Obtained new available market samples to add to sample book.
Expect to continue at minimum level of activity.

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by William C. Krueger, Project Leader

DIVISION: Natural Materials and Systems

DATE: April 15, 1976

✓ **PROJECT NO.:** 2982 Synthetic and Plastic Paper
(Co-project with 1744-2 and -8)

Class: FE

OBJECTIVE: Maintain awareness of world situation on plastic and synthetic paper.

BUDGET: I do not know.

SCHEDULE: Work is done on a routine "fill in" basis or as needs arise.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

Obtained samples of Kimdura, discussed field with representative of Rohm and Haas.

Future work at minimum level as needed.

THE INSTITUTE OF PAPER CHEMISTRY
QUARTERLY RESEARCH REPORT

DIVISION: Natural Materials and Systems

DATE: 1-6-76

✓
PROJECT NO.: 2982 IPC

OBJECTIVE: Maintain awareness of plastic and synthetic papers

BUDGET:

SCHEDULE: No definite schedule - minimal activity

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

minimal activity

THE INSTITUTE OF PAPER CHEMISTRY
QUARTERLY RESEARCH REPORT

DIVISION: DNMS

DATE: 10-7-75

✓ PROJECT NO.: 2982 Plastic & Synthetic Paper

OBJECTIVE: Maintain awareness of field
carried out along with 1744 -2

BUDGET:

SCHEDULE: Maintain minimal level of activity as needed

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

Continue minimal level of activity

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by: W. C. Krueger, Group Leader

DIVISION: Natural Materials and Systems

DATE: July 8, 1975

✓ PROJECT NO.: 2982 - Survey of Synthetic Fiber and Other Non-conventional Printing Substrates

Class: FE

OBJECTIVE:

Maintain a minimal awareness relative to plastic and synthetic papers. Carried out jointly with some sponsored project activity in Annex.

BUDGET: \$1,000 (?)

SCHEDULE: No definite schedule. To be carried out at a minimal level.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

We have completed a sample book of various domestic and foreign plastic and synthetic papers. We have retained one copy with other copies being forwarded to sponsors of Annex programs. This was done largely at their expense. Expect to add to this sample book when appropriate samples become available. Also expect to maintain awareness of both foreign and domestic developments in this field.

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

DIVISION: 32 Natural Materials and Systems

DATE: 3/25/75

✓ PROJECT NO.: 2982
IPC

Group Leader: W. C. Krueger

Class: FE

OBJECTIVE: Maintain awareness of Plastic & Synthetic Papers
to complement 1744-1

BUDGET: \$1,000

SCHEDULE: On time available basis on budget limits permit.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

Plan to continue on same basis Minimal activity

Prepared by W. Krueger.

FILED JAN 21 1975

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

Prepared by W. C. Krueger

DIVISION: Natural Materials and Systems

DATE: January 15, 1975

Project Leader: Wm. C. Krueger

✓ PROJECT NO.: 2982

Class: FE

OBJECTIVE:

This project was initiated to maintain an awareness of world activities in the field of synthetic and plastic papers. Useful in conjunction with other (classified) projects, this program also provides records in Central Files for others to use.

BUDGET: \$1,000

SCHEDULE: July 1, 1974--June 30, 1975

Work performed on a time available basis or as situations of interest arise.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

DIVISION: Natural Materials & Systems

DATE: Sept. 27, 1974

✓ PROJECT NO.: 2982 - Survey of Synthetic Fiber and Other Nonconventional Printing Substrates" (FE)

Project Leader: William C. Krueger

OBJECTIVE:

This project was initiated to maintain an awareness of world activities in the field of synthetic and plastic papers. Useful in conjunction with other (classified) projects, this program also provides records in Central Files for others who may have need of them.

BUDGET: \$1,000

SCHEDULE:

7/1/74 - 6/30/75 Work is performed on a time available basis or as situations of interest arise.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

This program has proved valuable as a co-project to another project as well as providing a convenient IPC record of contacts, etc. To date, a volume containing nonconventional printing substrates has been prepared. Future work will involve keeping this volume current.

Prepared by Wm. C. Krueger

THE INSTITUTE OF PAPER CHEMISTRY

QUARTERLY RESEARCH REPORT

DIVISION: Natural Materials & Systems

DATE: Sept. 27, 1974

✓ PROJECT NO.: 2982 - "Survey of Synthetic Fiber and Other Nonconventional Printing Substrates" (FE)

Project Leader: William C. Krueger

OBJECTIVE:

This project was initiated to maintain an awareness of world activities in the field of synthetic and plastic papers. Useful in conjunction with other (classified) projects, this program also provides records in Central Files for others who may have need.

BUDGET: \$10,000

SCHEDULE:

9/1/70 - 6/30/71 Work is performed on a time available basis or as situations of interest arise.

SUMMARY OF RESULTS AND PLANS FOR FUTURE WORK:

This program has proved valuable as a co-project to another (classified) project as well as providing a convenient IPC record of contacts, etc. To date, a volume containing nonconventional printing substrates has been prepared. Future work will involve keeping this volume current.

Prepared by Wm. C. Krueger

PROJECT REPORT FORM

Copies to: J. W. Swanson
W. C. Krueger
Weiner

✓ PROJECT NO. 2982
 COOPERATOR IPC
 REPORT NO. 1
 DATE March 14, 1974
 NOTEBOOK none PAGE _____

 SIGNED William C. Krueger
 William C. Krueger

SYNTHETIC AND PLASTIC PAPERS

INTRODUCTION

This project was set up originally as a joint effort with Project 2801-2 (confidential project). The original intent was not to involve any significant laboratory or research as such but rather to serve as a mechanism to maintain market awareness, etc., to further efforts under 2801-2. This report summarizes the major activities carried out to date on this project and some of the work under 2801-2.

SUMMARY OF ACTIVITIES

The field of plastic and synthetic papers has been rather fluid in technology, market predictions, costs, etc. Japan has been one of the leaders on the world scene but many of their efforts, although highly heralded, have met with poor results.

The definitions of plastic and/or synthetic paper are questions in themselves. The scope of this project includes primarily printing substrates that fall in one of the three categories listed below.

1. Film based materials
2. Synthetic fiber alone or with vegetable fiber
3. Synthetic pulp alone or with vegetable fiber

Under 2801-2 all published volumes (four to date) of V. Wolpert's survey of Synthetic and Plastic Paper have been acquired and are in the Annex.

These volumes probably represent the most complete and thorough text in this field, especially on a world-wide basis.

Some preliminary work was carried out investigating the use of x-ray diffraction infrared spectrophotometry. Both appear to be useful tools to determine the type of most synthetic or plastic papers. To be of maximum use, however, both methods of analysis would have to be done on as many known samples as could be obtained. The sponsors of 2801-2 do not wish to fund this effort at this time.

Sample books containing many of the leading products on the world market have been prepared. One copy of this sample book will be in the Dard Hunter Museum or in the Annex. Other copies have been supplied to the sponsors of 2801-2.

Other than maintaining an awareness of world developments, activity on both Projects 2982 and 2801-2, will be "wound down" but still maintaining the capability to respond to any needs that may arise from the sponsors of 2801-2. Additional publications in this field will be acquired as they become available.