

painting, and that we obtained a very important material for artistic activity.

As regards the drawbacks and peculiarities of the new material, the artist must get accustomed to them through experience. The surface structure may even allow to create new possibilities of artistic impression. The great disadvantage of changes after drying can be omitted by pressing the composite over some periods while drying. Some drawings were obtained in this way, but it is necessary to elaborate procedures suitable for use in different cases.

Conclusions

- A technology was developed allowing to manufacture keratin fibrous composites with a very high, up to 70%, chicken feather content
- The technology enables to re-use chicken feathers, a very troublesome waste of the poultry industry, which is almost non-biodegradable and up to the present without serious possibilities of re-use.
- The technology concerns the manufacture of a range of fibrous paper-like composites, mainly keratin/cellulose blends but also keratin/synthetic fibre blends.
- Especially the use of keratin/cellulose blends with cotton linters as the cellulose content was confirmed. Paper-like sheets designed for use as material for artistic water - colour paintings were developed and evaluated positively. The paper-like composites offer great possibilities for original artistic creation.
- Additional future research is planned to eliminate some drawbacks of the composites, especially the changes in dimension while drying in a tensionless state, which at present demands the use of pressing the sheets over some periods of drying.
- Additional investigation are also planned in order to develop other applications of fibrous paper-like keratin composites.

Editorial Note

International and Polish authorities have evaluated the technology developed very highly. The Authors have been awarded, among others, by:

- *The Gold Medal Eureka - The Belgian and International Trade Fair For Technological Innovation, Brussels November 2009.*

- *The Gold Medal of International Invention Show & Technomart, Taipei 2010.*
- *Prize of the Polish Ministry of Science and Higher Education, Warsaw 2010.*
- *The Gold Medal Concours Lepine. LE Salon International de L'Invention de Paris, Paris 2011.*

Acknowledgment

The investigation presented in this paper was carried out as a part of research project No. N N507 395238 financially supported by the Polish Ministry of Science and Higher Education over the years 2010 – 2013.

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Received 08.10.2010 Reviewed 06.10.2011

Technical University of Lodz Faculty of Material Technologies and Textile Design

Department of Physical Chemistry of Polymers

The research activity of the Department is focused on areas related to the chemistry and physical chemistry of polymers. The main directions of scientific activity are as follows:

- investigation of the polyreaction process, in particular matrix polymerisation,
- physico-chemical characteristics of polymers and copolymers,
- study of the relationship between their structure and properties,
- synthesis of multimonomers,
- chemical modification of synthetic and natural polymers in order to obtain products with specific properties,
- copolyesters of chitin a new bioactive materials for medical applications,
- surface modification of textile materials by deposition of polyelectrolyte nanolayers.

The Department has at its disposal the following modern measuring techniques for the physical and chemical analysis of polymers:

- gel permeation chromatography equipment, consisting of a Waters Alliance separation module and multiple detector system: refractive index, UV-VIS, intrinsic viscosity and right angle laser light scattering;
- FTIR spectrometer system 2000 from Perkin-Elmer with data collection and processing software;
- UV-VIS spectrometer Lambda 2 from Perkin-Elmer;
- differential scanning calorimeter DSC7 from Perkin-Elmer;
- thermobalance coupled with an infrared spectrometer from Perkin-Elmer.

Theme cooperation: research of the surface modification of textiles using polyelectrolyte nanolayers (Leibniz Institut für Polymerforschung, Dresden, Germany); chitin derivatives and their applications (National Institute of Agrobiological Sciences + NIAS, Tsukuba, Japan).

The Department's staff conduct classes on a variety of topics at all levels of education at the Faculty of Material Technologies and Textile Design. These classes cover subjects such as chemistry, the physical chemistry of polymers, instrumental methods in the physico-chemical characterization of polymers, polymer materials, etc.

For more information please contact:

Department of Physical Chemistry of Polymers
Technical University of Lodz
ul. Zeromskiego 116, 90-924 Lodz, Poland
tel.: (48)(42) 631-33-60
e-mail: rojan@p.lodz.pl
web site: http://www.k41.p.lodz.pl/