P-044	**Industrial information system on microencapsulation**	

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INTRODUCTION AND OBJECTIVES

One of the important intellectual advantages of a company is its own expertise, which allows for increasing added value of products. Industrial knowledge (know-how) is a result of years of research and development (R&D) activities and experiences in a specialised field. In addition to ongoing R&D projects, an appropriate strategy of continuous recording and archiving of knowledge, protocols and experiences is of key importance, together with maintenance and updating of a specialized R&D knowledge base (Sumiga, 2010).

With the development of information technologies, Internet, World Wide Web and information services (hosts), researchers have gained access to numerous free and payable bibliographic and factual databases. One of the largest professional international information services, STN International, provides access to more than 200 databases in science and technology. Important sources of scientific and technological information are patents, which are accessible in full text free of charge. Patent offices around the world annually receive more than 1,800,000 patent applications and grants more than 600,000 patents per year. Rapid growth of scientific and technological publications is becoming an increasing information challenge for researchers, who need advanced skills and knowledge to selectively find, analyse, structure and use the right information in the context of their R&D domains. During the higher education at the universities, before entering the labour market, future researchers have to develop a critical and ethical attitude in obtaining and using information, as well as skills to manage data into knowledge (Stopar, 2010). The information literacy programmes at universities are therefore becoming of key importance.

Microencapsulation is a typical multidisciplinary field with a rapid growth of information, diverse applications, and a large amount of patents (Boh, 2004). Annual growth of new documents in the CAplus database has reached 3000 (Figure 1).

The main **purpose of our work** was to present the development and methodological approaches for the design and construction of an information system to support industrial R&D on microencapsulation.

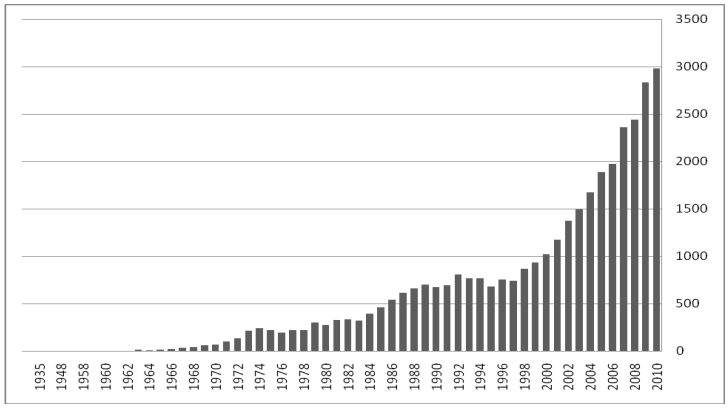

Figure 1: Annual growth of new documents on microencapsulation in CAplus database; search profile microcapsules OR microencapsulation trough Scifinder Scholar

MATERIALS AND METHODS

The following hosts, databases, software and methodologies have been used for search and retrieval of relevant documents on microencapsulation: (1) hosts, databases and search engines: STN International, Scifinder Scholar, Web of Science, Free Patents Online, Espacenet, Google Scholar; (2) software and applications for data transfer and processing: Reference Manager, Endnote, Jabref, Procite and Bibliographix; (3) programming environments tested for industrial information system construction: My SQL, Oracle Database, Postgre SQL, IBM DB2, Microsoft Access, Open Office Base, Lotus Notes, Microsoft SQL Server and SQ Lite; (4) heuristic information methods: structuring of data in to systems for tree and modular structures.

RESULTS AND DISSCUSION

The core of our prototype industrial information system on microencapsulation is (1) a module with structured information from scientific and technical literature (AofS&TL), consisting of two parts (Figure 2): a bibliographic segment (Biblio), and a factual segment (Facto) with structured information on main raw materials (wall materials, core materials, emulsifiers etc.), obtained by analysis of full text documents. One bibliographic record may refer to several factual parts, which allows for effective document review, further analysis of the content, and identification of correlations between parameters. Based on protocols of chemical process of microencapsulation, correlations between input materials and final properties of the microcapsules, alone or applied in products, can be recognised and identified.

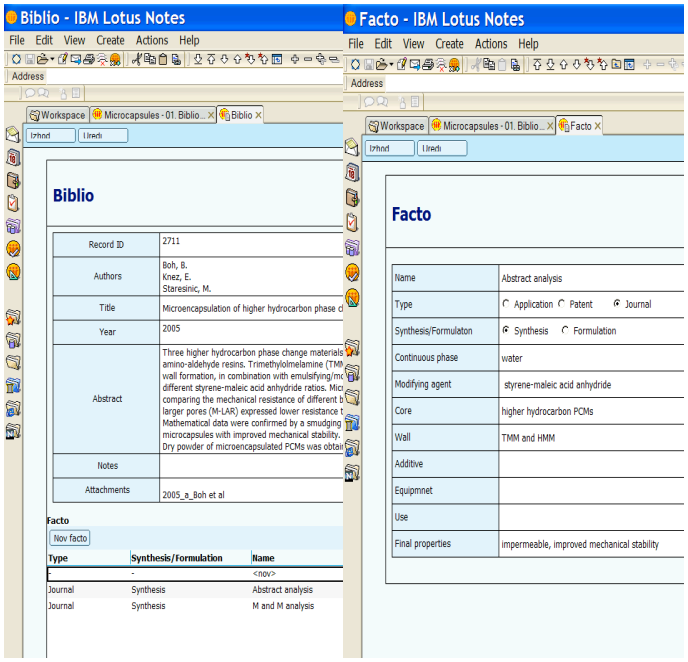

Figure 2 : Biblio and Facto segments of AofS&TL module of an industrial information system on microencapsulation, built in Lotus notes

In addition to the first module, additional six modules have been designed (Figure 3): (2) technological module describing microencapsulation procedures, recipes and instructions for work, with technical and safety data sheets of raw materials, intermediates and products; (3) module on the results of analyses and tests of raw materials, intermediates and products (Figure 4); (4) market module with structured data on past collaborations and results of market reviews, including data on producers, users, products, and services; (5) module on R&D and technological projects; (6) documentation on transfers of microencapsulation technologies from laboratory to semi-industrial and industrial production; (7) module with educational materials, and a collection of own publications and presentations.

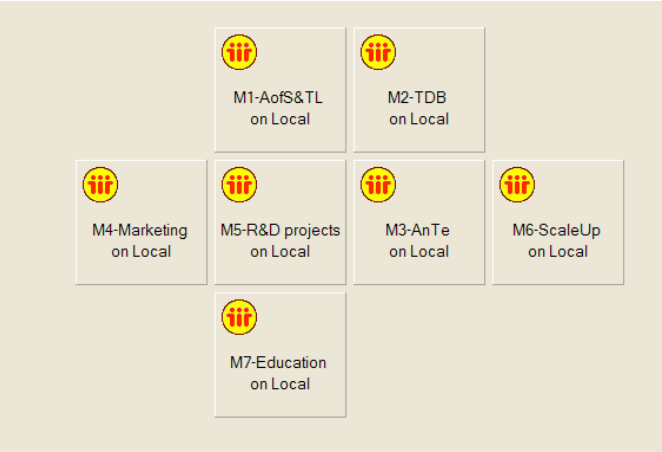

Figure 3 : Main entry screen to seven modules of the industrial information system on microencapsulation (Lotus notes)

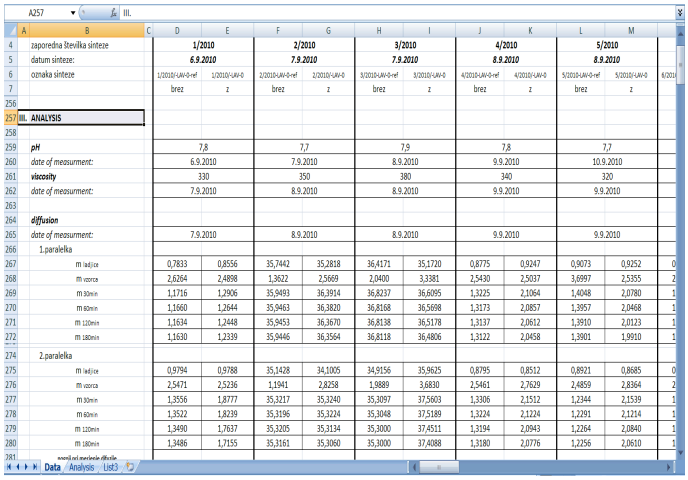

Figure 4: Part of an input document of final microcapsules suspension properties measurements, for the generation of final analysis report (Excel)

CONCLUSIONS

Exponential growth of available information calls for development and use of methodological approaches to search, retrieve, collect, analyze and synthesize information into knowledge in the shortest time possible. This is especially important in multidisciplinary fields like microencapsulation, where the information is scattered and fragmented in many applications. Building of a specialized in-house information system to support R&D in microencapsulation has become an important strategic goal and a valuable tool for the development of higher added-value products based on microcapsules. The information system preserves and archives R&D knowledge and industrial know-how, thus reducing the dependence on human resources and fluctuations of trained specialists in the company. At the same time, the methodology, structure and the prototype of the information system has been a part of a Ph.D. work in the field of scientific and technological informatics, with examples on chemical microencapsulation methods.

REFERENCES

- Boh B. (2004) *Microencapsulation: applications, patents and trends*. in *Expert's conference "Applications of immobilisation/bioencapsulation in medicine, pharmacy, food technology and biotechnology" and COST Steering Committee Meeting* (Association of Chemicals Engineers – 25-27 June 2004 – Belgrade , Serbia and Montenegro) 1-4. (Supplement of Chemical Industry, Vol. 56, 2004, No. 6a).
- Stopar et al. (2010) *MERILA in kazalci informacijske pismenosti v visokem šolstvu - Information literacy competency standards for higher education.* Zveza bibliotekarskih društev Slovenije (Ljubljana, Slovenia) 23pp.
- Sumiga B. and Boh B. (2010) *Information system for a sustainable support of research and development in chemical industry*. in *International Conference InfoKomTeh 2010* (Evropska svetovalnica – 27th October 2010, Ljubljana) 485-500.

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