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Research and Development in the Field of Advanced Materials, 2001 to 2003

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0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
p preliminary
r revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F too unreliable to be published

Note

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Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses and governments. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

The science and innovation information program

The purpose of this program is to develop useful indicators of science and technology activity in Canada based on a framework that ties them together into a coherent picture. To achieve the purpose, statistical indicators are being developed in five key entities:

- Actors: are persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that license their technologies, and determining the field of study of graduates.
- Activities: include the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- Linkages: are the means by which S&T knowledge is transferred among actors. Measures include the flow of graduates to industries, the licensing of a university's technology to a company, co-authorship of scientific papers, the source of ideas for innovation in industry.
- Outcomes: are the medium-term consequences of activities. An outcome of an innovation in a firm may be more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- Impacts: are the longer-term consequences of activities, linkages and outcomes. Wireless telephony is the result of many activities, linkages and outcomes. It has wide-ranging economic and social impacts such as increased connectedness.

The development of these indicators and their further elaboration is being done at Statistics Canada, in collaboration with other government departments and agencies, and a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a limited picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and we are continuing with our efforts to understand the characteristics of innovative and non-innovative firms, especially in the service sector that dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries that lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology in which it invests over five billion dollars each year. In the past, it has been possible to say only *how much* the federal government spends and *where* it spends it. Our report Federal Scientific Activities, 1998 (Cat. No. 88-204) first published socio-economic objectives indicators to show *what* the S&T money is spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information has been used to provide a context for performance reports of individual departments and agencies.

As of April 1999, the Program has been established as a part of Statistics Canada's Science, Innovation and Electronic Information Division.

The final version of the framework that guides the future elaboration of indicators was published in December, 1998 (Science and Technology Activities and Impacts: A Framework for a Statistical Information System, Cat. No. 88-522). The framework has given rise to A Five-Year Strategic Plan for the Development of an Information System for Science and Technology (Cat. No. 88-523).

It is now possible to report on the Canadian system on science and technology and show the role of the federal government in that system.

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Research and Development in the Field of Advanced Materials

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Introduction

This document describes the current state of our knowledge regarding the statistical information aimed at measuring the scientific effort devoted to research and development (R&D) on advanced materials. This article will present the data on advanced materials from Statistics Canada's Research and Development in Canadian Industry (RDCI) Survey.

Materials science is a multidisciplinary research area that studies the relations governing the structure and properties of materials[1].

Nonetheless, the National Research Council of Canada (NRC) and the organizations it supports can be referred to in order to identify technologies and processes for developing advanced materials The mandate of the Industrial Materials Institute (IMI) is to increase scientific and technical capabilities, as well as to develop the innovation potential of businesses, through R&D. Research is largely focused on categories of materials such as metals, polymers and ceramics as well as composites and alloys of these substances, (National Research Council Canada, 2006).

R&D on advanced materials is identified in the RDCI as systematic investigation in the field of engineering and natural sciences through tests or analyses aimed at the acquisition of new or improved knowledge and the creation of new products and procedures using advanced materials such as metals (including highly purified metals or superalloys), ceramics and carbon (including optoelectronics such as optical fibre and carbon- or graphite-based products) and polymers (including high-performance reinforced plastics and other high-performance polymers).

The population analysed in this document covers all businesses that perform or fund a minimum of $1 million in R&D and that responded to the RDCI detailed questionnaire. More specifically, businesses that have a minimum of $1 million in current expenses and capital expenditures on R&D are covered. The statistics produced thus pertain to the population of businesses that report R&D expenditures associated with work on advanced materials.

Background

In 2003, total intramural R&D expenditures (in current dollars) for the business enterprises that reported spending $1 million or more on R&D reached more than $11 billion, representing some 87% of total industrial R&D expenses (Statistics Canada, 2005).

Businesses funding or performing R&D that reported more than $1 million in R&D work spent $351 million on work in advanced materials, or approximately 2.6% of total intramural R&D expenditures ($13 billion) for the entire industrial sector.

To gain a better understanding of the R&D sector in the advanced materials field, this activity is compared to other emerging activities, namely businesses that perform R&D in software development and pollution prevention and treatment (Table 1).

1 In the 2003 study "Stratégie de développement et identification d'occasions d'affaires pour le Québec dans le secteur des matériaux avancés", by Jean-François Audet, advanced materials are defined as materials that are used in the manufacturing of new or improved products that have a strong technological component and that confer on them, from a performance point of view (physical or functional), a marked advantage as compared to more commonly used materials.

Table 1 Comparison between R&D spending on advanced materials, software development, and pollution prevention and treatment for 2003 (Businesses that perform or fund at least $1 million on R&D)

	R&D activity on advanced materials			R&D activity on software development			R&D activity on pollution prevention and treatment		
	$ million	thousands of people	number of businesses	$ million	thousands of people	number of businesses	$ million	thousands of people	number of businesses
R&D expenditures for this field of activity	351	…	…	3,013	…	…	255	…	…
Total R&D expenditures	2,741	…	…	6,087	…	…	3,277	…	…
Revenue	112,653	…	…	183,065	…	…	196,551	…	…
Number of performers	…	…	99	…	…	470	…	…	123
Staff engaged in R&D	…	14	…	…	44	…	…	17	…
Total number of employees	…	169	…	…	463	…	…	279	…

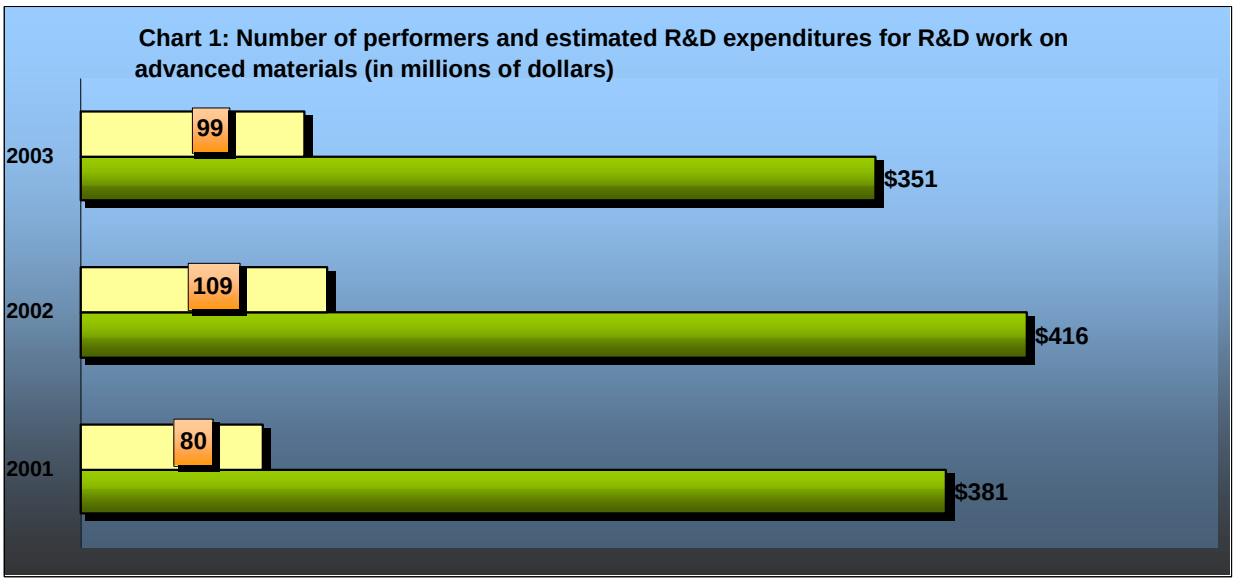
Source: Statistics Canada – RDCI Survey

Total R&D expenditures on work on advanced materials were $351 million, as compared to $255 and $3,013 million respectively on R&D on pollution prevention and treatment and software development.

Research and development activities relating to advanced materials are similar in magnitude (in terms of expenditures and the number of employees assigned to R&D) to research and development activities relating to pollution prevention and treatment. Clearly, this by no means approaches expenditures on software development, but it should be recalled that the latter constitutes a major activity among all industries that perform R&D.

Businesses that conduct research on advanced materials nonetheless put more than $2.7 billion into research and development in 2003, accounting for 20% of all industrial expenditures on R&D by performers spending 1 million or more on R&D. Research and development expenditures on advanced materials went from approximately $381 million in 2001 to more than $416 million in 2002 and $351 million in 2003, an 8.4% increase and an 18.7% decrease respectively, representing an overall decrease of 8.8% in R&D expenditures for this period.

Chart 1 gives an overview of the changes in the number of R&D performers and expenditures relating to advanced materials for the 2001 to 2003 period. The number of businesses for the period increased from 80 to 99, peaking at 109 businesses in 2002.



Source: Statistics Canada – RDCI Survey

Table 2 indicates that large businesses (500 or more employees) dominate research and development activities in the advanced materials sector. In 2003, 45% of businesses that reported performing research on advanced materials had more than 500 employees, as compared to 32% with fewer than 100 employees.

Research on new materials is a risky activity in terms of investment and commercialization opportunities. Given that it is easier for large businesses to bear the financial risks of such activity, it is not surprising that it would be large businesses that are active in this type of activity. Table 3 indicates that it is in fact large businesses that spend the most on R&D for work on advanced materials. It will be recalled that the analysis took into account only businesses that perform or fund a minimum of $1 million in R&D, and that all those that perform less are excluded. However, given that businesses that perform or fund a minimum of $1 million in R&D account for some 87% of all industrial R&D expenses (Statistics Canada, 2006).

Table 2 Breakdown in number of businesses with R&D expenditures on advanced materials, by size for firms spending at least $1 million on R&D

Firm size	Number of businesses that work with advanced materials		
	2001	**2002**	**2003**
Fewer than 100 employees (small)	26 (32.5%)	37 (34%)	32 (32.4%)
100-499 employees (medium-sized)	18 (22.5%)	26 (23.8%)	23 (23.2%)
500 employees and over (large)	36 (45%)	46 (42.2%)	44 (44.4%)
Total	**80**	**109**	**99**

Source: Statistics Canada – RDCI Survey
Between parentheses: percentage of total per year

The percentage of all R&D expenditures allocated to work on advanced materials for large businesses was more than 71% in 2003, versus 8% for businesses with fewer than 100 employees and close to 21% for medium-sized businesses (from 100 to 499 employees).

Table 3 Estimated amounts of R&D expenditures for advanced materials, by size, for firms spending at least $1 million on R&D (millions of dollars)

Firm size	Estimated R&D expenditures on advanced materials		
	2001	**2002**	**2003**
Fewer than 100 employees (small)	28 (7.4%)	40 (9.6%)	28 (8%)
100-499 employees (medium-sized)	105 (27.5%)	108 (26%)	72 (20.5%)
500 employees and over (large)	248 (65.1%)	268 (64.4%)	251 (71.5%)
Total	**381**	**416**	**351**

Source: Statistics Canada – RDCI Survey
Between parentheses: percentage of total per year

Although the number of medium-sized businesses rose from 18 to 26 units from 2001 to 2002, the latter did not really contribute to the increase in R&D expenditures between 2001 and 2002. Small and large businesses were the main contributors to the significant increase in R&D expenditures on advanced materials between 2001 and 2002. Small businesses contributed more than $12 million to this increase and large ones more than $20 million.

However, the drop in R&D expenditures on advanced materials between 2002 and 2003 can largely be attributed to medium-sized businesses, since they account for $36 million of the $65 million total decrease.

A field of endeavour in which the business's country of control is significant

The contrast is striking when the data are viewed according to the business's country of control.

First, when Tables 4 to 6 are compared, it is immediately apparent that the average revenue of businesses that perform R&D on advanced materials is lower for those under Canadian control. Foreign-controlled businesses are fewer in number but on average have more employees – 3,176 versus 1,214 for Canadian-controlled businesses in 2003.

The average number of people assigned to R&D work for businesses that perform R&D work on advanced materials[2] has been decreasing since 2001 for Canadian-controlled businesses, whereas an increase is noted for the same period for foreign-controlled businesses. However, the decrease in staff assigned to R&D for Canadian-controlled businesses can be attributed to an extremely limited number of large Canadian businesses.

The increase in the number of performers between 2001 and 2003 is solely due to Canadian-controlled businesses, which rose from 57 to 74, while the number of foreign-controlled businesses remained relatively constant over the period.

Revenue, staff engaged in R&D, and the total number of employees dropped between 2001 and 2003. The decrease in these indicators can be attributed to Canadian-controlled companies.

2 People engaged in R&D are counted as full-time equivalents whereas employment size is a count of persons.

Tables 4 to 6:
Statistics on staff engaged in R&D, number of employees and revenues of businesses that spend at least $1 million on R&D and had expenditures on advanced materials, by country of control.

Table 4 Total of R&D expenditures on advanced materials

	Staff engaged in R&D		Number of employees		Revenues ($ million)		Number of businesses
Year	Total (in thousands)	Average	Total (in thousands)	Average	Total	Average	Total
2001	16.8	210	171	2,134	108,778	1,359	80
2002	14.7	135	174	1,599	132,057	1,211	109
2003	13.6	137	169	1,709	112,653	1,137	99

Source: Statistics Canada – RDCI Survey

Table 5 Canadian-controlled businesses expenditures on R&D on advanced materials

	Staff engaged in R&D		Number of employees		Revenues ($ million)		Number of businesses
Year	Total (in thousands)	Average	Total (in thousands)	Average	Total	Average	Total
2001	13.5	237	93	1,634	37,477	657	57
2002	10.6	128	94	1,136	52,479	632	83
2003	9.1	123	90	1,214	43,008	581	74

Source: Statistics Canada – RDCI Survey

Table 6 Foreign-controlled businesses expenditures on R&D on advanced materials

	Staff engaged in R&D		Number of employees		Revenues ($ million)		Number of businesses
Year	Total (in thousands)	Average	Total (in thousands)	Average	Total	Average	Total
2001	3.3	143	78	3,371	71,301	3,100	23
2002	4.1	158	80	3,078	79,578	3,060	26
2003	4.5	182	79	3,176	69,646	2,785	25

Source: Statistics Canada – RDCI Survey

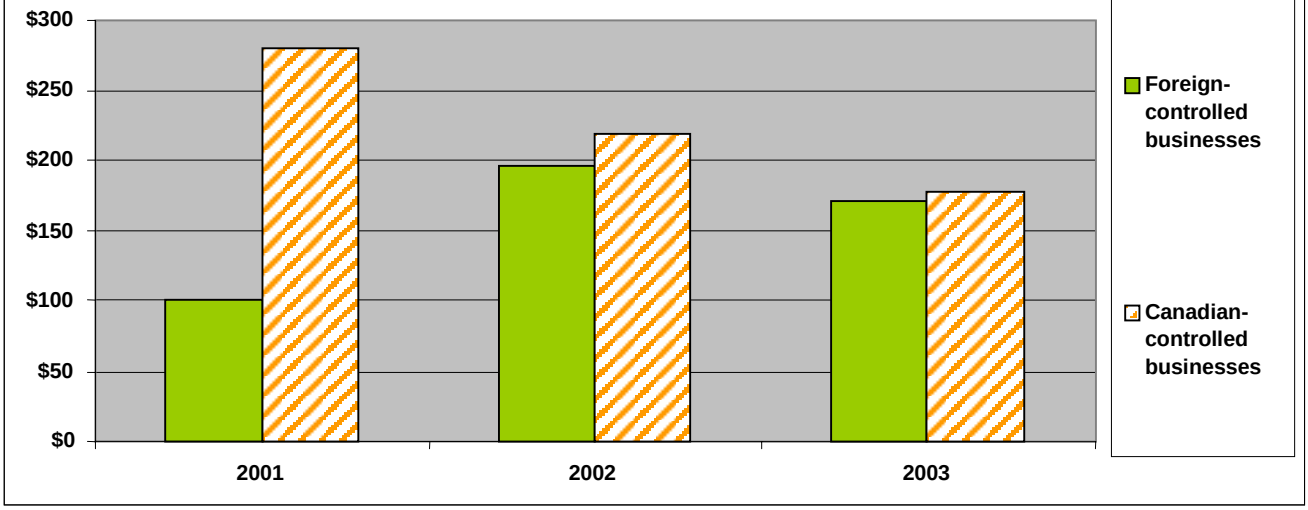
One way of measuring the contribution to the research effort in the advanced materials sector entails assessing R&D expenditures associated with work on advanced materials. Chart 2 shows these expenditures according to the business's country of control. It is remarkable to see that, although R&D expenditures in this sector are higher for Canadian-controlled businesses, foreign-controlled businesses caught up during the 2001-2003 period.

In 2003, R&D expenditures in this area were $178 and $172 million respectively for Canadian-controlled and foreign-controlled businesses, whereas in 2001 such expenditures were close to $281 million for Canadian-controlled businesses, as compared to $100 million for foreign-controlled businesses (see Chart 2).

Large businesses (500 or more employees) under foreign control accounted for most of the R&D expenditures for work on advanced materials. In 2003 this percentage represented more than 60% of expenditures by large businesses.

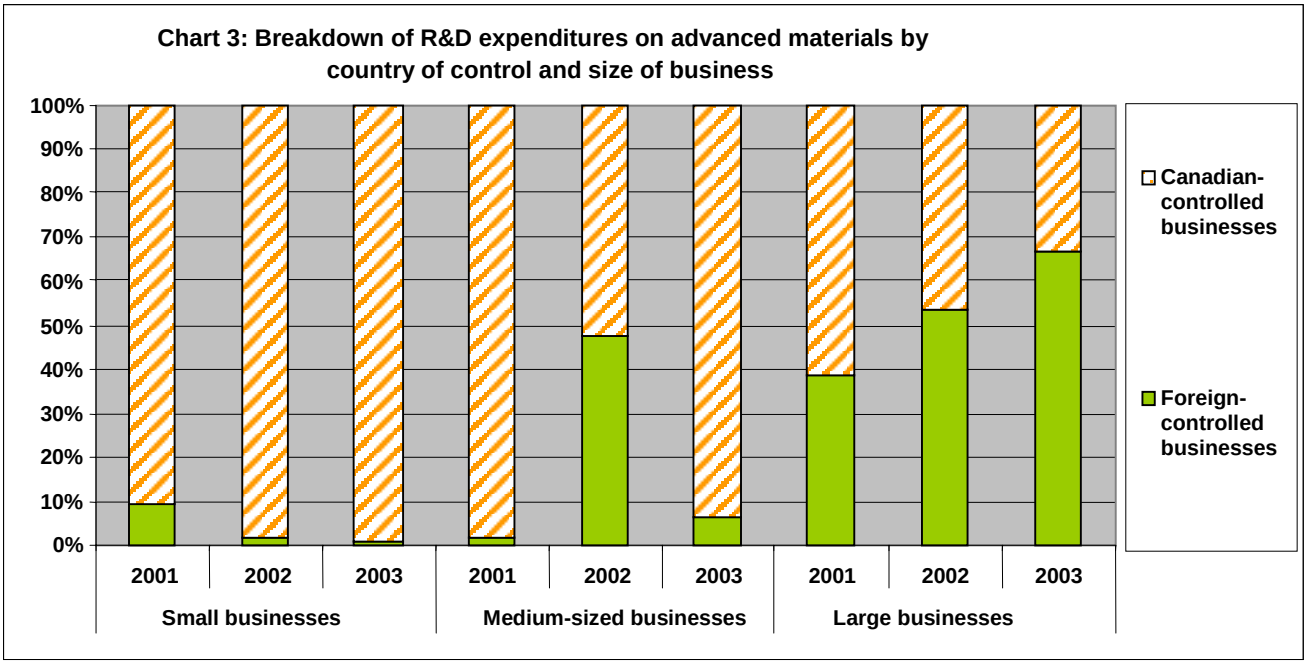
For small businesses (fewer than 100 employees) and medium-sized ones (between 100 and 499 employees), the major portion of R&D expenditures on advanced materials was incurred by Canadian-controlled businesses.

Chart 2: R&D expenditures in advanced materials sector by country of control (in millions of dollars)



Source: Statistics Canada – RDCI Survey

Chart 3: Breakdown of R&D expenditures on advanced materials by country of control and size of business



Source: Statistics Canada – RDCI Survey

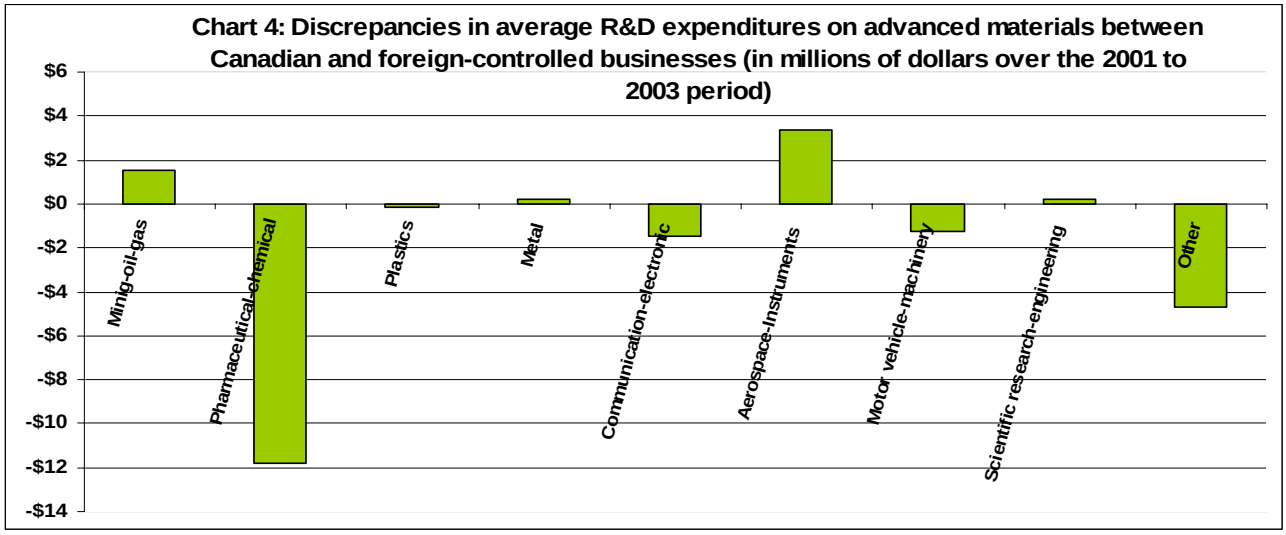
In 2002, medium-sized businesses under foreign control experienced a significant increase in their R&D expenditures on advanced materials, accounting for close to 50% of such expenditures.

From 2001 to 2003, foreign-controlled businesses with over 500 employees steadily gained ground on Canadian-controlled businesses in terms of R&D expenditures on advanced materials (see Chart 3).

Sectoral research in the field of advanced materials is not homogeneous in terms of the country that controls the business. Some sectors are dominated by foreign-controlled businesses, others by Canadian-controlled businesses.

One relatively simple way of determining this entails differentiating between average R&D expenditures on advanced materials for Canadian-controlled businesses and those of foreign-controlled businesses. Chart 4 shows the results of this calculation.

For example, Chart 4 shows that Canadian-controlled businesses spent on average (over the 2001-2003 period) $1.6 million more in the mining, oil and gas industries than foreign-controlled businesses (see appendix for further details on industry groupings and for further information on the correspondence in terms of official classification).[3]



Source: Statistics Canada – RDCI Survey

The R&D expenditures were incurred during the 2001-2003 period. This indicator obviously has its own limitations; it simply gives an indication of the difference in the average research effort between Canadian- and foreign-controlled businesses. We performed the calculation on the basis of average expenditures rather than total amounts in order to control for the effect of business size. Although total R&D expenditures on advanced materials are more substantial in the communications and electronics industries in Canadian controlled businesses, on average foreign-controlled businesses allocate more R&D expenditures to this area.

On the basis of this indicator, for the pharmaceutical, chemical, communications and electronics industries as well as the motor vehicle and machinery industries, the businesses that allocate more R&D expenditures per business on average for advanced materials are foreign-controlled ones. Conversely, Canadian-controlled businesses dominate in the mining and oil and gas industries as well as the aerospace products and navigational, measuring, medical and control instruments and parts industries in terms of R&D expenditures on advanced materials.

3 The industry groupings proposed in this text were made solely to establish a breakdown by industry for analysis purposes. For confidentiality reasons, we were unable to give a more disaggregated level of detail. For further details on industries and the correspondence of industrial codes, see the appendix.

It is interesting to note that, in terms of total R&D expenditures on advanced materials, it is the pharmaceutical and chemical products industry grouping that accounts for the major portion of R&D expenditures (see Chart 5 and Table 7) and that this grouping also shows the largest discrepancy in average expenditures in favour of foreign-controlled businesses. Thus, the industry grouping that incurred the most research expenditures on advanced materials was largely dominated by foreign-controlled businesses.

Table 7 R&D expenditures for activities on advanced materials in 2003 for industrial groups dominated by foreign-controlled businesses (million dollars)

	Canadian-controlled businesses ($ million)	Foreign-controlled businesses ($ million)
Pharmaceutical – chemical	2.9	36.3
Communications – electronic	17.4	25.5
Motor vehicles – machinery	9.6	15.2
Other	148.2	95.5
Total	**178.1**	**172.5**

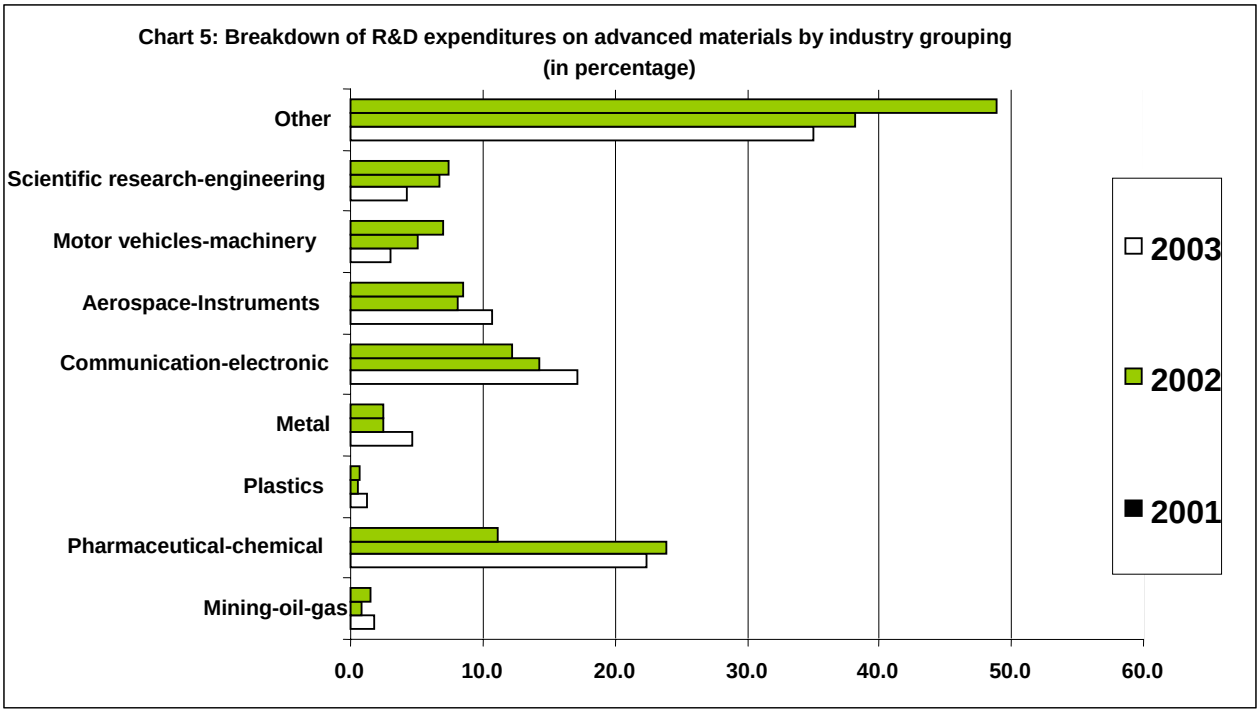
Source: Statistics Canada – RDCI Survey

R&D on advanced materials by industry grouping

The pharmaceutical – chemical group spent the most on R&D for advanced materials in 2001 and 2002.

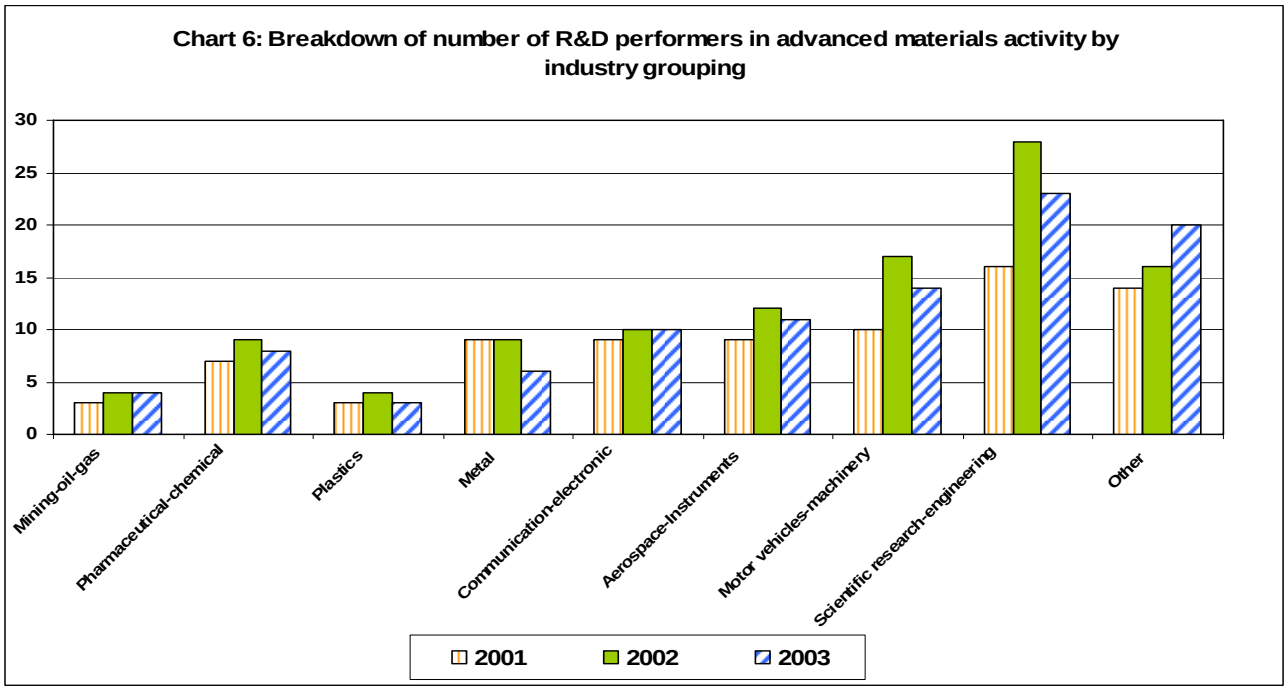
These industries were followed by the communications – electronics industries, which accounted for 17% and 14% of R&D expenditures on advanced materials in 2001 and 2002 respectively. In 2003, this industry grouping incurred the major portion of R&D expenditures on advanced materials, at 12%, thereby exceeding the share of such expenditures by the pharmaceutical – chemical group.

The percentage of expenditures allocated for work on advanced materials in the aerospace products-instruments industries slid from 11% in 2001 to 8% in 2002 and 2003. A decrease in this percentage from 5% in 2001 to 2% in 2002 and 2003 was also witnessed in the metal products industry.



Source: Statistics Canada – RDCI Survey

The overall percentage accounted for by the nine industry groupings that spend the most on R&D in advanced materials dropped from 65% in 2001 to 50% in 2003. This finding can be interpreted as a decrease in the concentration of the industrial structure for R&D activity on advanced materials.



Source: Statistics Canada – RDCI Survey

The number of businesses that perform R&D in advanced materials increased slightly for all of the most active industries in this field (see table 9). The number of businesses in the scientific research and engineering industries went from 15 in 2001 to 28 in 2002 a 46% increase in one year for this industry grouping.

Table 8 Percentage of R&D expenditures on work on advanced materials

	Percentage of R&D expenditures on advanced materials		
Industry grouping[4]	**2001**	**2002**	**2003**
Mining-gas-oil	13%	7%	9%
Pharmaceuticals-chemicals	33%	31%	20%
Plastics	54%	44%	38%
Metals	40%	43%	18%
Communications-electronics	16%	42%	24%
Aerospace-instruments	29%	22%	21%
Motor vehicles-machinery	20%	21%	22%
Scientific research and engineering	36%	27%	32%
Other	36%	46%	37%
Overall average for all industries	**31%**	**31%**	**27%**

Source: Statistics Canada – RDCI Survey

4 See appendix for details on industry groupings.

On average, it was the plastics industry that allocated the largest percentage of R&D expenditures to advanced materials: 54% in 2001 and 38% in 2003.

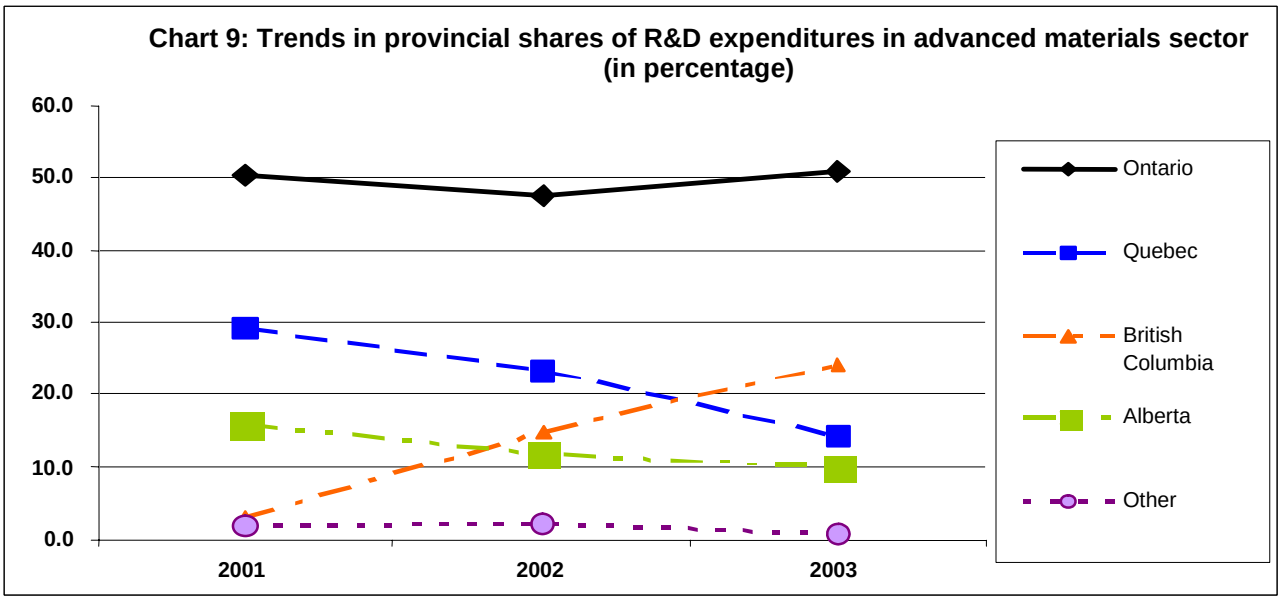
It is interesting to note that the percentage of R&D expenditures on advanced materials decreased on average between 2001 and 2003. In other words, in 2003 industries spent less on average and overall on R&D on advanced materials as compared to 2001, during which the number of performers increased.

R&D performers that spent a minimum of $1 million on this activity devoted on average between 27% and 31% of their R&D expenditures in the advanced materials field during the 2001-2003 period. This field of activity is on the leading edge of technology and the results in terms of commercialization or application do not show up until many years later.

Regional concentration of R&D expenditures in the advanced materials field

The trend in the percentage of R&D expenditures in the advanced materials sector by province is almost identical to the trend in the percentage of employment assigned to R&D in this field. We therefore present here only the trend in R&D expenditures.

Chart 9: Trends in provincial shares of R&D expenditures in advanced materials sector (in percentage)



Source: Statistics Canada – RDCI Survey
Other: Prince Edward Island; Newfoundland and Labrador; Nova Scotia; New Brunswick; Manitoba; Saskatchewan; Yukon, Northwest Territories and Nunavut

Table 9 Number of businesses involved in R&D work on advanced materials by province, 2001 to 2003 period

	Number of businesses that perform R&D work on advanced materials		
	2001	**2002**	**2003**
Ontario	47	71	61
Quebec	26	34	32
British Columbia	12	14	17
Alberta	10	13	11
Other	10	14	8

Source: Statistics Canada – RDCI Survey
Note: For Ontario and (Québec) we include Toronto (Montréal) area and National Capital Region.

Quebec is the province that experienced the most significant decrease in this activity between 2001 and 2003. Quebec's share of total R&D expenditures on advanced materials dropped from 29% to 14% between 2001 and 2003. This decrease could largely be attributed to the decrease in R&D investments, despite the fact that the number of performers in Quebec rose from 26 to 32 between 2001 and 2003.

British Columbia proved to be the province with the largest increase in total R&D expenditures on advanced materials – from 3% to 24% – between 2001 and 2003. This increase can be explained by the fact that the number of R&D performers in the field of advanced materials rose from 12 to 17 between 2001 and 2003.

The percentage of R&D expenditures on advanced materials remained relatively constant in Ontario at approximately 51%, despite a substantial decrease in the number of performers between 2001 and 2003.

The decrease in the regional share of R&D expenditures on advanced materials in Quebec seems to have worked in British Columbia's favour between 2001 and 2003.

Conclusion

In 2003, Canadian industry spent $351 million on R&D relating to research on advanced materials. In terms of expenditures, this activity is essentially the same as the research effort invested in waste and pollution prevention and treatment. In 2003, businesses that performed R&D in the field of advanced materials in Canada incurred, on average, 27% of their total R&D expenditures in this field of activity.

Although R&D on advanced materials is considered an emerging field, businesses that operate in this area generated more than $112 billion in revenues and employ some 13,000 people in 2003.

This document has shown that R&D in the field of advanced materials was an activity dominated by businesses with more than 500 employees, but also by businesses under foreign control, in 2003.

Businesses with more than 500 employees spent more than $250 million in 2003, representing close to 72% of total R&D expenditures on this activity.

Overall, R&D expenditures on advanced materials by foreign-controlled businesses caught up with those of Canadian-controlled businesses in 2003, with $172 million and $178 million allocated to this activity respectively.

On average, foreign-controlled businesses in the field of R&D on advanced materials spent more in 2003 than Canadian-controlled businesses in the pharmaceutical, medicine and other chemical products industries, as well as in the computer and peripheral equipment, communications equipment and semi-conductor and other electronic components industries.

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Appendix

Correspondence between industry groupings and industrial code and NAICS 2002 code from RDCI Survey

Mining and oil and gas extraction = Mining, Oil and Gas Extraction
Industrial codes: 004 and 005
NAICS codes 2002: 2111, 2131, 2121, 2122, 2123, 2131

Pharmaceutical-chemical products = Pharmaceutical and Medicine + other Chemical
Industrial codes: 016 and 017
NAICS codes 2002: 3254, 3251, 3252, 3253, 3255, 3256, 3259.

Plastic products = Plastic Product + Petroleum and Coal Products
Industrial codes: 015, 018 and 019
NAICS codes 2002: 3241,3261, 3262.

Metal products = Non-Metallic Mineral Product + Primary Metal (Ferrous) + Primary Metal (Non-Ferrous) Fabricated Metal Product
Industrial codes: 020, 021, 022 and 023
NAICS codes 2002: 3271, 3272, 3273, 3274, 3279, 3311, 3312, 3313, 3314, 3315, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329

Communications-electronics = Computer and Peripheral Equipment + Communications Equipment + Semiconductor and Other Electronic Component
Industrial codes: 025, 026 and 027
NAICS codes 2002: 3341, 3342, 3344

Aerospace products-instruments = Navigational, Measuring, Medical and Control Instruments + Other Computer and Electronic Product + Electrical Equipment, Appliance and Component + Aerospace Product and Parts + All Other Transportation Equipment
Industrial codes: 028, 029, 030, 032 and 033
NAICS codes 2002: 3345, 3343, 3346, 3351, 3352, 3353, 3359, 3364, 3365, 3366, 3369

Motor vehicles-machinery = Motor Vehicle and Parts + Machinery
Industrial codes: 031, 024
NAICS codes 2002: 3361, 3362, 3363, 3331, 3332, 3333, 3334, 333511, 3335, 3336, 3339, 333920

Scientific research-engineering = Architectural, Engineering and Related + Computer System Design and Related + Management, Scientific and Technical Consulting + Scientific Research and Development
Industrial codes: 041, 042, 043 and 044
NAICS codes 2002: 5413, 5415, 5416, 5417.

Other =
Industrial Codes: 001, 002, 003, 006, 007, 008, 009, 010, 011, 012, 013, 014, 034, 035, 036, 037, 038, 039, 040, 045, and 046
NAICS Codes 2002: 1111, 1112, 1113, 1114, 1122, 1123, 1141, 1119, 1121, 1124, 1129, 1151, 1152, 1131, 1132, 1133, 1153, 1142, 1125, 2211, 2212, 2213, 5621, 5622, 5629, 2361, 2362, 2371, 2372, 2373, 2379, 2381, 2382, 2383, 2389, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3121, 3122, 3131, 3132, 3133, 3141, 3149, 3211, 3212, 3219, 3221, 3222, 3231, 3371, 3372, 3379, 3151, 3152, 3159, 3161, 3162, 3169, 3391, 3399, 4111, 4121, 4131, 4132, 4133, 4141, 4142, 4142, 4143, 4144, 4145, 4151, 4152, 4153, 4161, 4162, 4163, 4171, 4172, 4173, 4179, 4181, 4182, 4183, 4184, 4189, 4191, 4411, 4412, 4413, 4421, 4422, 4431, 4441, 4442, 4451, 4452, 4453, 4461, 4471, 4481, 4482, 4483, 4511, 4512, 4521, 4529, 4531, 4532, 4533, 4539, 4541, 4542, 4543, 4811, 4812, 4821, 4831, 4832, 4841, 4842, 4851, 4852, 4853, 4854, 4855, 4859, 4861, 4862, 4869, 4871, 4872, 4879, 4881, 4882, 4883, 4884, 4885, 4889, 4911, 4921, 4922, 4931, 5111, 5112, 5121, 5122, 5151, 5152, 5161, 5171, 5172, 5173, 5174, 5175, 5179, 5181, 5182, 5191, 5211, 5221, 5222, 5223, 5231, 5232, 5239, 5241, 5242, 5261, 5269, 5311, 5312, 5313, 5321, 5322, 5323, 5324, 5331, 6211, 6212, 6213, 6214, 6215, 6216, 6219, 6221, 6222, 6223, 6231, 6232, 6233, 6239, 6241, 6242, 6243, 6244, 5411, 5412, 5414, 5418, 5419, 5511, 5612, 5613, 5614, 5615, 5616, 5617, 5619, 6111, 6112, 6113, 6114, 6115, 6116, 6117, 7111, 7112, 7113, 7114, 7115, 7121, 7121, 7131, 7132, 7139, 7211, 7212, 7213, 7221, 7222, 7223, 7224, 8111, 8112, 8113, 8114, 8121, 8122, 8123, 8129, 8131, 8132, 813310, 8134, 8139, 8141, 9111, 9112, 9113, 9114, 9119, 9121, 9122, 9129, 9131, 9139, 9141, 9191

Catalogued publications

Science, Technology and Innovation statistical publications

88-001-XIE Science statistics
88-003-XIE Innovation analysis bulletin
88-202-XIE Industrial research and development, intentions (with 2004 preliminary estimates and 2003 actual expenditures) (annual)
88-204-XIE Federal scientific activities (annual)
88F0006XIE Science, Innovation and Electronic Information Division working papers
88F0017MIE Science, Innovation and Electronic Information Division research papers

88-001-X Volume 30 – 2006

No. 1 Provincial distribution of federal expenditures and personnel on science and technology, 1997/1998 to 2003/2004 (February)

No. 2 Biotechnology scientific activities in federal government departments and agencies, 2004/2005 (March)

No. 3 Estimates of total spending on research and development in the health field in Canada, 1988 to 2005 (May)

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No. 1 Distribution of federal expenditures on science and technology by province and territories, 2002-2003 (January)

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No. 6 Estimation of research and development expenditures in the higher education sector, 2003-04 (December)

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No. 18 Survey of intellectual property commercialization in the higher education sector, 2003 (November)

No. 19 Estimation of research and development expenditures in the higher education sector, 2003-2004 (December)

No. 20 Estimates of Canadian research and development expenditures (GERD), Canada, 1994 to 2005, and by province 1994 to 2003 (December)