

Research Article

A Global Scientific Research Productivity on Polymer Chemistry: A Scientometric Study

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The term “Polymer Chemistry” has been used as a search keyword in the international Indexing and citation database web of science. To examine polymer chemistry from 2007 to 2021. The study covers 15 years. The research coverage includes the year-wise distribution of articles, Types of documents, Growth rate, and Country-wise distribution of articles the total number of articles published was 1429 articles. Out of 1429 articles, the topmost number of articles published was in the year 2013 with 132(9.2%) records, followed by 117 (8.2%) records in the year 2017, and 115(8%) records were published in the year of 2015 and 2019. The lowest number of articles published was 7 (0.5%) in the year 2021.

Keywords: Polymer Chemistry, Scientometric, Polymer, Growth rate, Bibliometric.

1. Introduction

Scientometric is a measurable evaluation of research publication literature patterns of all micro and macro communication along with their authorship by mathematical and statistical calculation. According to Allan Pritchard, the term “Bibliometric” is the application of mathematical and statistical methods to books and other communication mediums, all the studies point toward the advantage and disadvantage analysis of the literature published in polymer chemistry from 2007 to 2021. Polymer chemistry is a peer-reviewed journal published by the Royal society of chemistry. The journal publishes original and significant cutting-edge research articles.

Polymer Chemistry is a sub-discipline of chemistry that focuses on the chemical synthesis, Structure and chemical and physical properties of polymer and macromolecules. The Principles and methods used within polymer chemistry are also applicable through a wide range of other chemistry sub-disciplines like organic chemistry, Analytical chemistry and physical chemistry. Many materials have polymeric structures, form fully inorganic metals and ceramics to DNA and other biological molecules, However, polymer chemistry is typically referred to in the context of synthetic, organic compositions, Synthetic polymers are ubiquitous in commercial materials and products in everyday use commonly referred to as plastics and rubbers and major components of composite materials. Polymer chemistry can also be included in the broader fields of polymer science or even nanotechnology both of which can be described as encompassing polymer physics and polymer engineering.

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2. Objective of the Study

The main purpose of the study is

- To analyse the year-wise distribution of polymer chemistry from the year 2007 to 2021
- To analyse the journal-wise distribution of publications.
- To show word frequency in the publications of polymer chemistry research articles.
- To analyse the documents, type wise distribution of publications.
- To analyse the ratio of growth of polymer chemistry research.
- To identify the country-wise distribution of articles.
- To analyse the BRICS Countries' wise distribution of publications.

3. Methodology

The data download from a web of science core collection maintained by Thomson Reuters Clarivate Analysis database was used to get the data entitled the keyword of “Polymer Chemistry” Articles in the journal published between 2007 to 2021 were taken for the study. The study covers the 15 years of published articles 1429 in the journal. The data have been analysed with the help of Histcite and MS Excel open source software and based on the objectives the tables were framed.

4. Data Analysis and Interpretation

Table.1 Year of publications of polymer chemistry research (data source: WoS)

Publication Year	No. of Articles	Cumulative	%	Cumulative %
2007	55	55	3.8	3.8
2008	83	138	5.8	9.6
2009	84	222	5.9	15.5
2010	98	320	6.9	22.4
2011	99	419	6.9	30.1
2012	110	529	7.7	39.3
2013	132	661	9.2	47.1
2014	112	773	7.8	55.1
2015	115	888	8.0	62.3

2016	103	991	7.2	70.5
2017	117	1108	8.2	77.6
2018	102	1210	7.1	84.7
2019	115	1325	8.0	92.7
2020	97	1422	6.8	99.5
2021	7	1429	0.5	100.0
Total	1429		100	

Table: 1 shows the year-wise distribution of polymer chemistry research from 2007 to 2021 (Fifteen years) was done. The total number of articles published was 1429 articles. Out of 1429 articles, the topmost number of articles published was in the year 2013 with 132(9.2%) records, followed by 117 (8.2%) records in the year 2017, and 115(8%) records were published in the year of 2015 and 2019.

The lowest number of articles published was 7 (0.5%) in the year 2021. The first five years had a minimum number of articles published and more articles got published in the last five years.

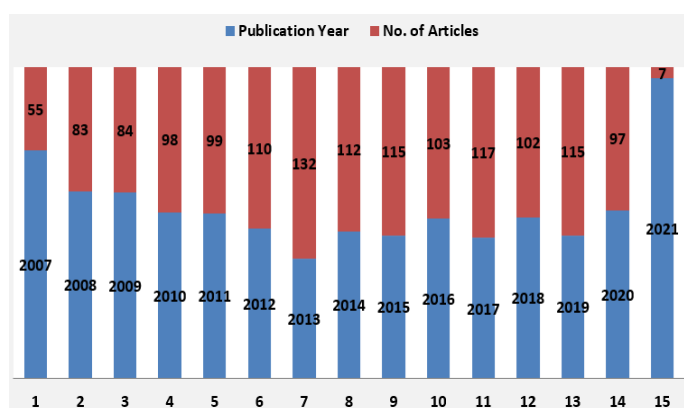


Fig.1. Year of publications of polymer chemistry research

Table: 2 show the journal-wise distribution of polymer chemistry research. The maximum number of 304 (21.3%) records was produced by the journal ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY, followed by POLYMER CHEMISTRY was 87(6.1%) and JOURNAL OF POLYMER SCIENCE PART A-POLYMER CHEMISTRY are 46(3.2%) records.

The least number of 8 (0.6%) records was produced by the journal of INORGANICA CHIMICA ACTA.

Table.2 Journal wise distribution of publications (top 30)

Titles of the Journal	No. of Articles	%
ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY	304	21.3
POLYMER CHEMISTRY	87	6.1
JOURNAL OF POLYMER SCIENCE PART A: POLYMER CHEMISTRY	46	3.2
MACRO MOLECULES	43	3
MACROMOLECULAR RAPID COMMUNICATIONS	35	2.4
POLYMER	26	1.8
JOURNAL OF CHEMICAL EDUCATION	21	1.5
RSC ADVANCES	20	1.4
CHEMICAL COMMUNICATIONS	18	1.3
LANGMUIR	17	1.2
ANGEWANDTE CHEMIE-INTERNATIONAL EDITION	16	1.1
MACROMOLECULAR CHEMISTRY AND PHYSICS	16	1.1
ACS MACRO LETTERS	15	1
BIOMACRO MOLECULES	14	1
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY	14	1
EUROPEAN POLYMER JOURNAL	13	0.9
PROGRESS IN POLYMER SCIENCE	13	0.9
PURE AND APPLIED CHEMISTRY	13	0.9
ACS APPLIED MATERIALS & INTERFACES	11	0.8
NATURE CHEMISTRY	11	0.8
POLYMERS	11	0.8
SOFT MATTER	11	0.8
ACCOUNTS OF CHEMICAL RESEARCH	10	0.7
CHEMICAL & ENGINEERING NEWS	10	0.7
CHEMISTRY OF MATERIALS	10	0.7
CHEMICAL SOCIETY REVIEWS	9	0.6
DALTON TRANSACTIONS	9	0.6
MACROMOLECULAR SYMPOSIA	9	0.6
CHEMISTRY-A EUROPEAN JOURNAL	8	0.6
INORGANICA CHIMICA ACTA	8	0.6

Table.3 Word wise distribution of publications (top 30)

Word	No. of Articles	%	TLCS	TGCS
CHEMISTRY	1429	100	921	47596
POLYMER	952	66.6	606	29554
POLYMERS	515	36	322	18450
CLICK	326	22.8	482	13479
SYNTHESIS	205	14.3	277	8004
BASED	164	11.5	99	6002
THIOL	95	6.6	169	4439
PROPERTIES	55	3.8	16	3618
APPLICATIONS	60	4.2	24	3276
SURFACE	104	7.3	38	3062
SCIENCE	46	3.2	116	2845
MATERIALS	59	4.1	86	2809
COMPOSITES	16	1.1	4	2740
POLYMERIZATION	89	6.2	80	2679
PROCESSING	15	1	0	2669
USING	101	7.1	61	2659
COORDINATION	65	4.5	14	2645
CARBON	22	1.5	2	2618
MECHANICAL	11	0.8	1	2490
ELECTRICAL	4	0.3	0	2361
NANOTUBE	2	0.1	0	2315
GREEN	71	5	95	2275
ORGANIC	90	6.3	18	2050
FORMATION	19	1.3	3	2023
NETWORKS	30	2.1	21	1976
RADICAL	31	2.2	35	1961
FIBER	10	0.7	2	1946
NEW	65	4.5	17	1788
POROUS	34	2.4	9	1774
CHITOSAN	2	0.1	0	1762

*TLCS – Total Local Citation Score

*TGCS – Total Global Citation Score

The above Table: 3 show the journals wise distribution of polymer chemistry research (data source: WoS). Among the word category-wise distribution, the highest contribution to polymer chemistry research was indexed in- chemistry, with 1429(100%) publications, followed by polymer 952(66.6%), and the third highly contributing words category was polymers 515(36%) words.

Table.4 Document type wise distribution of articles

Document type	No. of Articles	Cumulative	n/	Cumulative %
Article	763	763	53.4	53.4
Review	159	922	11.1	64.5
Editorial Material	56	978	3.9	68.4
Article; Proceedings Paper	18	996	1.3	69.7
Letter	3	999	0.2	69.9
Proceedings Paper	59	1058	4.1	74.0
News Item	16	1074	1.1	75.1
Review; Book Chapter	6	1080	0.4	75.5
Correction	17	1097	1.2	76.7
Article; Book Chapter	1	1098	0.1	76.8
Article; Retracted Publication	1	1099	0.1	98.3
Meeting Abstract	312	1411	21.8	98.6
Biographical-Item	15	1426	1.0	99.6
Book Review	3	1429	0.2	100
Total	1429		100	

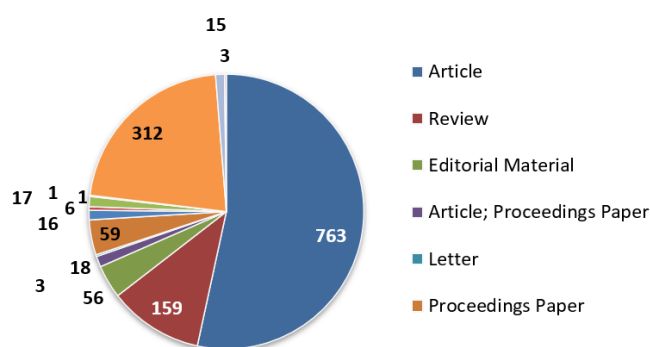


Fig.2. Documents type

The above Table: 4 show the journals wise distribution of polymer chemistry research. There are 14 types of documents published in this study. The study is classified into two broad groups; Article, Review,

Editorial Material, Article; Proceedings Paper, Letter, Proceedings Paper, News Item, Article; Retracted Publication, etc., The majority of the contributions 763(53.4) are articles. Followed by review 159(11.1%).by and large it is found that the scholarly communication of polymer chemistry research output is through articles and reviews.

Table.5 Year wise ratio of growth in polymer chemistry research

Publication Year	No. of Articles	Cumulative
2007	55	-
2008	83	1.5
2009	84	1.01
2010	98	1.16
2011	99	1.01
2012	110	1.11
2013	132	1.17
2014	112	8.48
2015	115	1.02
2016	103	8.95
2017	117	1.13
2018	102	8.71
2019	115	1.12
2020	97	8.43
Total	1429	

The above Table:5 shows that the journals wise distribution of polymer chemistry research (data source: WoS). The growth ratio changes from 1.17 to 8.48 and the growth ratio changes from 8.43 to 0.72.

$$\text{Ratio of growth} = \frac{\text{No. of Publications of present year}}{\text{No. of Publications of prior year}}$$

The country-wise literature on polymer chemistry has been analysed amongst the top 30 countries based on the extremely published articles in Table:6. The country-wise literature on polymer chemistry has been analysed among the top 30 countries based on the highly published article. The country USA with 507(35.5%) publications, It is followed by China with 236(16.5%) and India occupies 11th position with a total production of 34(2.4%) publications on polymer chemistry

research. The Czech Republic published the least number of publications 6(0.4%). The USA was a clear leading the publications. The USA is the clear leader with a highly dynamic country such as China, which is second, Germany third, and France fourth. This type of analysis also helps in identifying the countries which have to use the research work in the countryside.

Table.6 Country wise publications (top 30)

Name of the Country	Records	%
USA	507	35.5
Peoples R China	236	16.5
Germany	125	8.7
France	81	5.7
UK	75	5.2
Japan	68	4.8
Unknown	64	4.5
Australia	63	4.4
Belgium	47	3.3
Canada	44	3.1
India	34	2.4
South Korea	30	2.1
Spain	30	2.1
Netherlands	26	1.8
Italy	23	1.6
Turkey	22	1.5
Switzerland	20	1.4
Singapore	16	1.1
Greece	15	1
Poland	14	1
Taiwan	14	1
Iran	13	0.9
Brazil	10	0.7
Denmark	10	0.7
Egypt	10	0.7
Ireland	10	0.7
Russia	10	0.7
Saudi Arabia	9	0.6
Austria	7	0.5
Czech Republic	6	0.4

Table.7 BRICS Countries

Name of the Country	Records	Cumulative Records	%
Brazil	10	-	0.7
Russia	10	20	0.7
India	34	54	2.4
Peoples R China	236	290	16.5
South Africa	1	291	0.1
Total	291		

The table reveals the BRICS Countries' publication output. The 5 BRICS Countries, Brazil, Russia, India, China, South Africa and were involved in the polymer chemistry research publications. Most of the records were published in the BRICS Country china with 236(16.5%), followed by India with 34 (2.4%) records. The last is South Africa with 1(0.1%) publication.

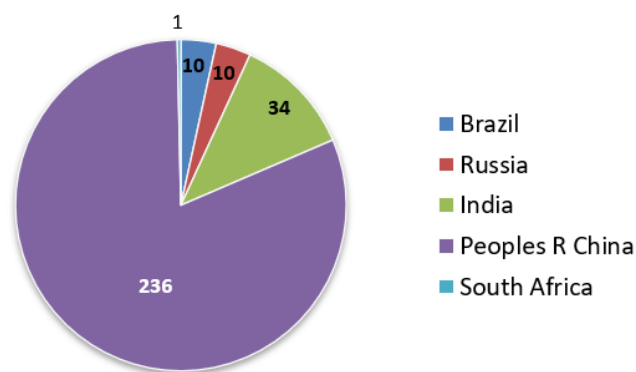


Fig.3. BRICS Country

5. Conclusions

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The journals wise distribution of polymer chemistry research. the maximum number of 304 (21.3%) records was produced by the journal abstracts of papers of the

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REFERENCE

[1] Sumathi, P., & Palaniappan, M. etc., (2020). A Scientometric analysis of research journal of chemistry and environment (2005-2019) Library Philosophy and Practice (e-journal). 4249. <https://digitalcommons.unl.edu/libphilprac/4249>.

[2] Gururaj, S., & Hadagali, I. etc., (2014). Scientific Productivity of Polymer Science Research: A Scientometric Study, SRELS Journal of Information Management, Vol 51(1), February 2014, p 51–57.

[3] Baskaran, C. (2013). Research productivity of Alagappa University during 1999-2011: A Scientometric study, DESIDOC Journal of Library & Information Technology, 33(3).

[4] Murugaiah, P., & Baskaran, C. (2013). Assessment of Research Collaboration on Human DNA in Japan during 1990-2011, International Journal of Library and Information Studies 3 (2).

[5] https://en.wikipedia.org/wiki/Polymer_chemistry#:~:text=Polymer%20chemistry%20is%20a%20sub,properties%20of%20polymers%20and%20macromolecules.

[6] <https://www.rsc.org/journals-books-databases/about-journals/polymer-chemistry>.

[7] https://en.wikipedia.org/wiki/Polymer_chemistry.

[8] S. Uppugalla, U. Male, P. Srinivasan, Design and synthesis of heteroatoms doped carbon/polyaniline hybrid material for high performance electrode in supercapacitor application, Electrochim. Acta 146 (2014) 242e248, <http://dx.doi.org/10.1016/j.electacta.2014.09.047>.

[9] Male U, Uppugalla S, Srinivasan P. Effect of reduced graphene oxide-silica composite in polyaniline: electrode material for high-performance supercapacitor. J Solid State Electrochem 2015;19(11):3381e8. [48]

[10] N Sriram, P Katakam. Formulation and Evaluation of Mucoadhesive Microspheres of Pioglitazone Hydrochloride Prepared by Ionotropic External Gelation Technique. Journal of Encapsulation and Adsorption Sciences, 2016; 6: 22-34.

[11] Jeevanandham, S., Dhachinamoorthi, D., Sekhar, K. B. C., Muthukumaran, M., Sriram, N., & Joysaruby, J. (2014). Formulation and evaluation of naproxen sodium orodispersible tablets “ A sublimation technique. *Asian Journal of Pharmaceutics (AJP)*, 4(1). <https://doi.org/10.22377/ajp.v4i1.124>

[12] Katakam P, Sriram N. Formulation and evaluation of mucoadhesive microspheres of pioglitazone hydrochloride prepared by solvent evaporation technique. Int J Biol Pharm Res 2012;3:1005-15.