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N Vasantha Raju

Govt. First Grade College, Talakadu, vasanthrz@gmail.com

N.S. Harinarayana

Department of Studies in Library and Information Science, University of Mysore, Mysore-570006,  
harinarayana@lisc.uni-mysore.ac.in

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# Research Productivity and Citation Impact of S.C. Sharma as Seen through the Scopus Database

Vasantha Raju N<sup>1</sup> & N.S. Harinarayana<sup>2</sup>

<sup>1</sup>Librarian, Government First Grade College, Talakadu-571122  
vasanthrz@gmail.com

<sup>2</sup>Professor, Department of Studies in Library and Information Science, University of Mysore, Mysore-570006  
harinarayana@lisc.uni-mysore.ac.in

## Abstract:

This study presented the bibliometric analysis of Sharma's research publications as found in the Scopus database. The study presents the publication profile of Sharma in terms of the number of papers published, top journals where Sharma has published his research papers frequently, subject area, author collaborations, and institutional collaboration and so on. The study also analyzes the research impact through citations count, highly cited papers and h-index. VOSviewer, a software tool for constructing and visualizing bibliometric networks, was used to visualize the co-author collaborations, country collaborations and keyword analysis. A comparative analysis of the Scopus and the Google Scholar indicates the differences existing between these databases for analyzing individual author's research and citation impact.

**Keywords:** Citation Impact, Bibliometrics, Research Productivity, Scopus, Sharma,

## 1. Introduction

Prof. S.C. Sharma is a renowned researcher in the field of materials science & engineering and also an academician of high repute. Currently, he is heading one of the critical institutions in the country - National Assessment and Accreditation Council (NAAC), a premier institution which assesses and accredits the Indian higher education institutions. Before taking the reins of NAAC in 2018, he had a short stint as a director of the Indian Institute of Information Technology (IIIT), Dharwad, Karnataka. He had also served as the Vice-Chancellor of Chhattisgarh Swami Vivekanand Technical University, Bilai, Chhattisgarh and also the Tumkur University, Karnataka. Sharma, during his full tenure at Tumkur University, did a phenomenal job and created a strong base for the new university by developing required infrastructure for the University to thrive in academic activities particularly in research and development. He was also the Principal of RV College of Engineering, one of the prestigious Engineering College in Bangalore, Karnataka, from 2004 to 2009.

Sharma has played a very significant role in making the RV College of Engineering, Bengaluru, as one of the major research centers in the field of technical education. For his immense contribution to the field of research and academic development, he has been conferred Doctor of Science (D. Sc.) from five universities, including the Deakin University, Australia. He is also a recipient of Doctors of Letters (D. Litt) for his contributions in the field of classical music from the Avinashlingam University for Women, Coimbatore, Tamil Nadu, India. He was conferred with honorary doctorates (Honoris Causa) from nine universities with the most recent one from Vijayanagara Sri Krishnadevaraya University, Karnataka, for his contribution in the field of Science & Technology. Sharma has also served in various capacities including, as the Adjunct Professor of Engineering at the Institute of Technology, West Virginia University, Montgomery, USA, Senior Scientist at the College of Engineering and Applied Science, University of Wisconsin-Milwaukee, USA and Visiting Scientist at the Department of Aerospace, Indian Institute of Science, Bangalore, India. Sharma was the former Vice-Chairman of the Karnataka State Higher Education Council (KSHEC) from 2010 to 2013. Karnataka State Higher Education Council (KSHEC) is the highest policy-making body of the Government of Karnataka in the field of higher education and research. He has also been conferred with various awards and accolades for his contributions in field of technical education in particular and education in general. Few notable examples are: Career Award and National Fellowship Award

from University Grants Commission (UGC), Karnataka Rajyothsava Award, highest civilian honor of Government of Karnataka for his distinguished contribution in the field of research and development and Dr. Raja Ramanna State Award for Scientist, 2011-12 conferred by Karnataka State Council for Science & Technology. Apart from all these, he has also served many academic committees and councils as a member and in other capacities including State Planning Board, Govt. of Karnataka; UGC Committee for preparing policy guidelines for the implementation of reservation for physically-challenged persons in admissions, recruitment and other amenities; and so on. He has also successfully guided more than 35 Ph.D. scholars for obtaining their doctoral degrees.

What is phenomenal in Sharma's academic career is his publication profile. Sharma has published more than 450 research papers in national and international journals and also published 120 plus articles in conference proceedings. He has been one of the sought after speakers for seminars, symposiums and scholarly meetings. At present (as on February 2020), Sharma has 8546 citations with an h-index of 48 as per Google Scholar. He and his research collaborators have filed 12 patent applications. For a researcher, 8000 citations and an h-index of more than 45 is indeed a rare distinction. This brief introduction to Sharma indicates his intellectual brilliance. In this context, here, the authors have attempted to analyze his scholarly footprints through bibliometric analysis.

## **2. Research Impact Assessment Studies**

The emergence of major citation databases such as the Web of Science, the Scopus and the Google Scholar have helped librarians, policymakers and other researchers involved in bibliometrics kind of studies to assess the intellectual output of individual scientists or institutions or countries. As a result, there is an increasing interest in analyzing the intellectual contributions of scientists or institutions/universities or countries and assessing the impact of journals or topics (Harinarayana & Vasantha Raju, 2009; Jacso, 2010; Sweileh, 2018; Wang, Zhu, Song & Hou, 2017).

The university ranking system in the world is gaining prominence across the globe; the bibliometric indicators have become an essential measurement for assessing the impact of universities and researchers. 'Academic Ranking of World Universities' (ARWU), 'Shanghai Ranking,' 'QS World University Rankings,' 'The Times Higher Education World University Rankings,' and 'CWTS Leiden

Ranking' use bibliometric indicators for measuring the impact universities and researchers have emphasized the importance Bibliometrics or research impact studies (Mishra, 2015).

India's National Institutional Ranking Framework (NIRF), introduced in the year 2015 by INFLIBNET, emphasizes the importance of documenting the impact of research publications and citations by using bibliometric indicators available through citation databases like the Web of Science, the Scopus and the Google Scholar. In this context, it is vital to analyze the research impact of an individual or institution using bibliometric methods/indicators.

In this study, we have attempted to analyze the research impact of Sharma S.C. by using bibliometric indicators such as the author's research publications profile, total citations, highly cited papers, h-index and other parameters.

### **3. Data Source & Methods**

The Scopus Citation Database of Elsevier, used in this study as a data source, collects research publications and citation data. The Scopus database is regarded as the largest abstracting and citation database of peer-reviewed literature in the field of science, technology, medicine, social sciences, and arts and humanities. It indexes around 23000 titles from more than 5000 world-renowned international publishers. The Scopus provides smart tools track, analyze and visualize research (the Scopus Content Coverage Guide, 2020), which some of them have been used here in this article to analyze and visualize Sharma's research output.

The Scopus ID of Sharma in the Scopus databases is 55702520600. All searches were made using this ID. The Scopus database was searched on 4<sup>th</sup> February 2020.

The search result found 327 publications or articles for Sharma published from 1989 to 2020. The 'Analyze author output' feature was used to collect the document by source, by type, by subject area and other similar features, and similarly 'View citation overview' of the Scopus was used to collect author (in this case Sharma) citation data and *h-index*.

The study also used VOSviewer (version 1.6.14 developed by Van Eck & Waltman), a software tool for constructing and visualizing bibliometric networks. In this article, we have used Density Visualization feature of VOSviewer (van Eck & Waltman, 2009) to show Sharma's co-authorship pattern and country collaborations and co-occurrence of keywords.

## 4. Publication Profile and Citation Impact of Sharma

This section analyzes the intellectual footprints of Sharma, through his research publications and citations that his works have received over the years.

### 4.1. Year-Wise Publications of Research Papers

Figure-1 presents the year-wise publications of research papers of Sharma. In 1989, one of his articles was indexed for the first time by the Scopus database. Thereafter, he has regularly engaged in publishing research papers and most of them were indexed by the WoS and/or the Scopus. His significant contributions have come between 2012 and 2019. During this period, he has published more than 60% (220 out of 327) of his research papers. Notably, during this period, Sharma was managing one or the other executive positions. For example, he was the Vice-Chancellor of Tumkur University between 2009 to 2013, Director of Dayananda Sagar Academy of Technology (2015 to 2016) and Management, Academic Advisor at IIIT-Dharwad (2016), Adviser and Professor at Jain Group of Institutions (2016 to 2018) and Director of NAAC since May 2018. The most surprising factor is that he was able to publish a large number of research papers, notwithstanding his executive positions.

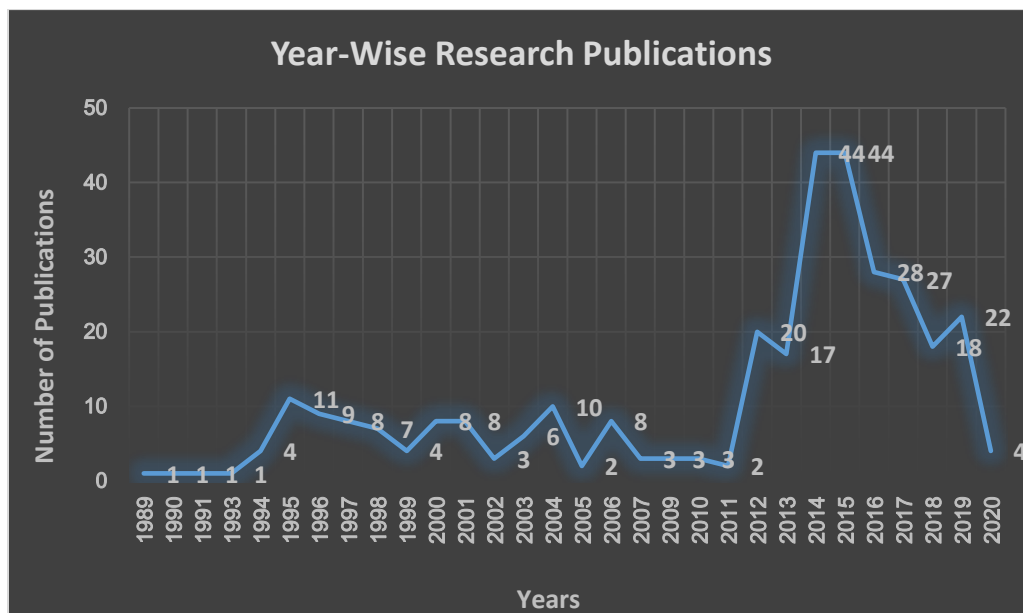
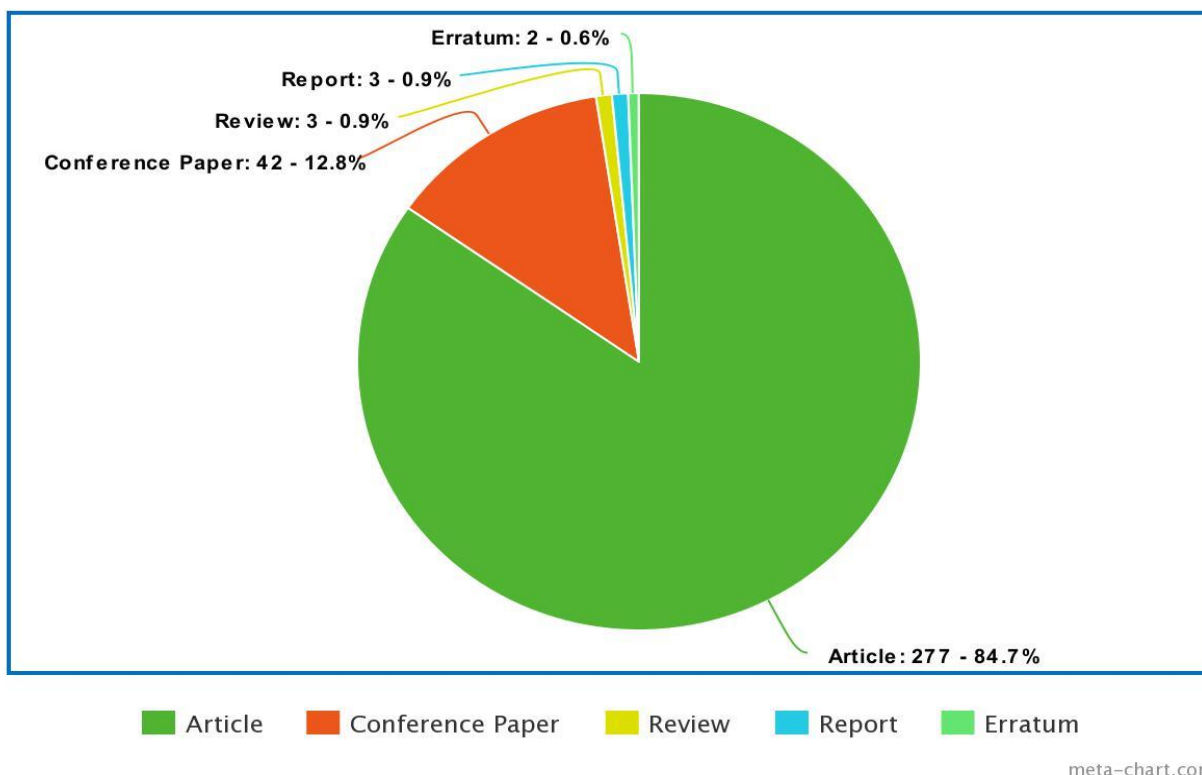


Figure-1: Year-Wise Distributions of Research Publications

### 4.2. Research Publications by Document Type

The Scopus database largely indexes research publications, mainly research articles published in scholarly journals. Almost 82% of the total publications of Professor Sharma consist of research articles, followed by conference papers (12.8%), as depicted in Figure 2. The reviews and reports were other forms of documents that the author has contributed. Two errata have also been published by Sharma. Figure 2 depicts Sharma's forte in research publications by document type.



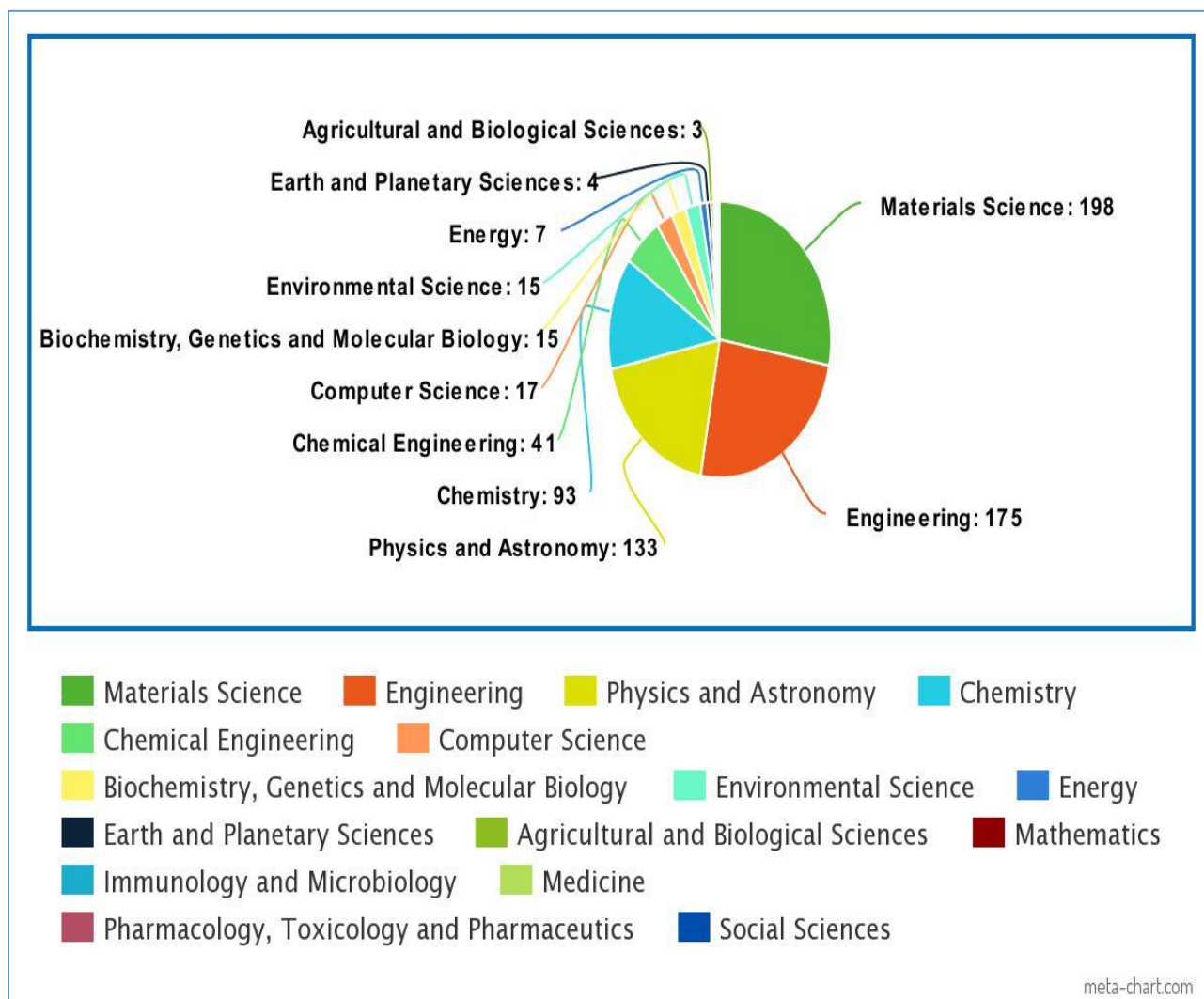
**Figure-2: Research Publications by Document Type**

### **4.3. Research Publications or Documents by Subject Area**

Figure 3 indicates the research area or subjects in which Sharma has frequented in his writings. The Scopus's Subject Area Classification, derived from All Science Journal Classification -ASJC, scheme has been the basis for classifying subject areas of Sharma's publications.

Sharma's 60% of publications covers the fields of Materials Science. Engineering, Physics and Astronomy, Chemistry and Chemical Engineering are the other fields of studies or subject areas where Sharma's contribution are significantly noted. Physical Sciences seems to be the broad subject

domain of interest to Sharma as seen from his publications. Figure 3 presents the subject areas or fields in which Sharma's research publications are centered around.



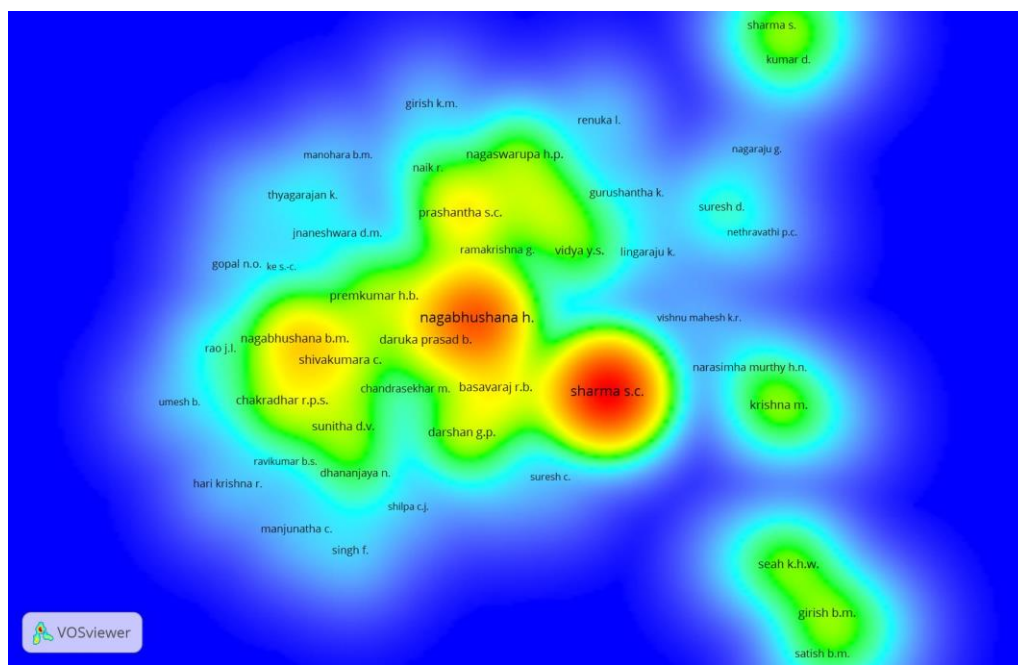
**Figure-3: Documents by Subject Area**

#### 4.4. Sharma's Co-Authorship Collaborations

Figure 4 presents the Sharma's co-authorship collaborations. The Density Visualization of VoSviewer has been used to depict the highest number of articles co-authored with Sharma. Colours indicate the density of author collaborations, colours ranging from blue (lowest density) to red (highest density) indicates the strength of the density.



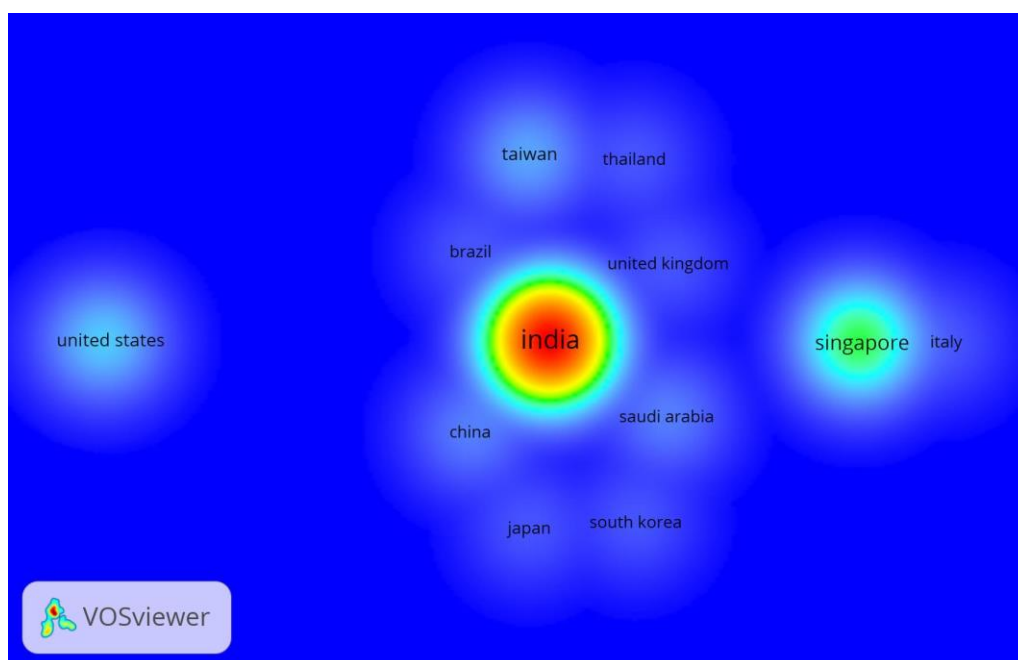
As can be seen in Figure-4, the authors or collaborators published the highest number of papers with Sharma that are closely connected and have the highest density (yellowish and reddish colour). Nagabhushana H. of C.N.R Rao Centre for Advanced Materials, Tumkur University, Karnataka, is the most significant co-author of Sharma with 187 papers together. Other co-authors with more than forty papers with Sharma are Nagabhushana, B.M of M. S. Ramaiah Institute of Technology, Bangalore (with 74 papers), Prashantha, S.C. of Department of Science, East-West Institute of Technology, Bangalore (with 67 papers), Daruka Prasad, B., Department of Physics, B.M.S. Institute of Technology, Yelahanka, Bangalore, Basavaraj, R.B. of C.N.R. Rao Centre for Advanced Materials Research, Tumkur University, Darshan, G.P., Department of Physics, Acharya Institute of Graduate Studies, Bangalore, Chakradhar, R.P.S., of CSIR-National Aerospace Laboratories, Bengaluru, Anantharaju, K.S. of Department of Chemistry, Dayananda Sagar College of Engineering, Bangalore and Shivakumara, C. of Solid State and Structural Chemistry Unit, Indian Institute of Science, Bengaluru.



**Figure-4: Density Visualization of Co-Authorship Pattern**

#### 4.5. Country Collaborations

Since Sharma has published most of his papers with Indian co-authors, India is at the top collaborative country of Sharma's publications output. Nevertheless, he has published research papers with more than 13 country collaborations. Singapore is the top collaborative foreign country of Sharma's publications. Seah, K.H.W. of the National University of Singapore, Singapore has collaborated with Sharma in as many as 36 publications. Other major country collaborations of Sharma are with Taiwan with six papers and the United States with five papers respectively. The density visualization of the country collaborations (Figure-5) also indicating the same with countries depicting in reddish and yellowish (high density) were the major countries that Sharma has high collaborations.



**Figure-5: Density Visualization of Country Collaborations**

#### **4.6. Top Ten Journals Where Sharma's Papers Have Published Frequently**

Sharma has published his research articles in as many as 108 journals. Table 1 presents the top ten journals in which he has frequently published his research publications. Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy is the journal where Sharma has published his highest number of research articles. Other significant journals where his articles have published frequently is Journal of Alloys and Compounds. This journal has the CiteScore of 4.12. Other journals where

Sharma has significantly published his research articles in Materials and Designs, Materials Research Bulletin, Journal of Luminescence, Journal of Materials Engineering and Performance and others as depicted in Table 1. The journals where Sharma has published his research articles frequently have a CiteScore of more than one. This indicates the quality of the journals that he and his collaborators have preferred for publishing their research papers.

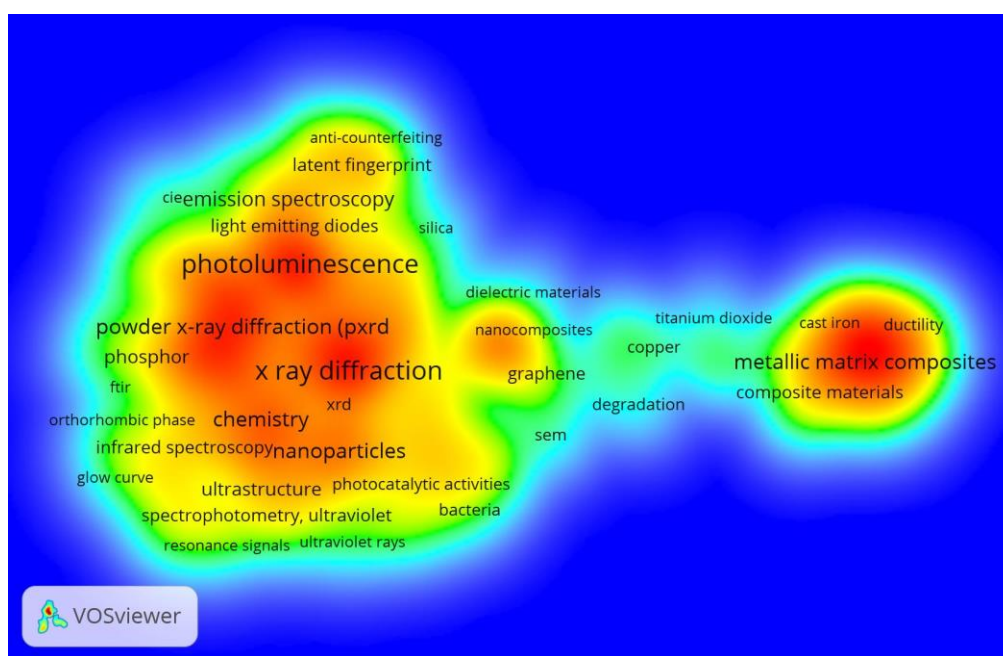
SL No	Journal Name	Number of Publications	% of 327	Journal CiteScore* 2018
1.	Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy	39	11.93	2.92
2.	Journal of Alloys and Compounds	35	10.70	4.12
3.	Materials and Design	13	3.98	6.25
4.	Materials Research Bulletin	13	3.98	3.12
5.	Journal of Luminescence	12	3.67	2.91
6.	Journal of Materials Engineering and Performance	12	3.67	1.67
7.	Journal of Reinforced Plastics and Composites	08	2.45	2.07
8.	Materials Research Express	08	2.45	1.33
9.	Wear	07	2.14	3.35
10.	Materials Today: Proceedings	06	1.83	1.09
Remaining Source Titles (Journals)		174	53.21	
Total		327	100	

\* CiteScore is a simple way of measuring the citation impact of serial titles such as journals, which was introduced by the Scopus in 2016. Similar to Impact Factor (JIF) of Journal Citation Report or JCR of Web of Science (WoS).

**Table-1: Top Ten Journals in Which Sharma has Frequently Published his Research Articles**

#### 4.7. Keyword Visualization of Sharma's Research Domain

Figure 6 presents the density visualization of the co-occurrence of keywords of Sharma's research articles. The keywords are derived from titles and the abstract of the articles authored by Sharma. The keywords found in the high-density area (reddish zone) are photoluminescence, emission spectroscopy, light-emitting diodes, latent fingerprints, anti-counterfeiting, powder x-ray diffraction (PXRD), x-ray diffraction, chemistry, nanoparticles, infrared spectroscopy, ultrastructure, spectrophotometry, ultrastructure, photocatalytic activities, ultraviolet, nanocomposites, graphene, metallic matrix composites, and composite materials. These keywords indicate the core areas of research of Sharma and his collaborators.



**Figure-6: Density Visualization of Co-Occurrence of Keywords**

The timeline view of the keywords presented in Figure 8 shows that Sharma's domain of research from 2013 to 2020 (till 04<sup>th</sup> February). Figure 8 shows that "photoluminescence" is the term that has topped the keyword timeline since 2014. It indicates that Sharma has published more on the subject area "photoluminescence." It can be assumed from this timeline that "photoluminescence" is the core area of his research. The other keywords that often found in the timeline are: "nano phosphor," "combustion synthesis," "thermoluminescence," "latent fingerprints," and "x-ray diffraction." Though

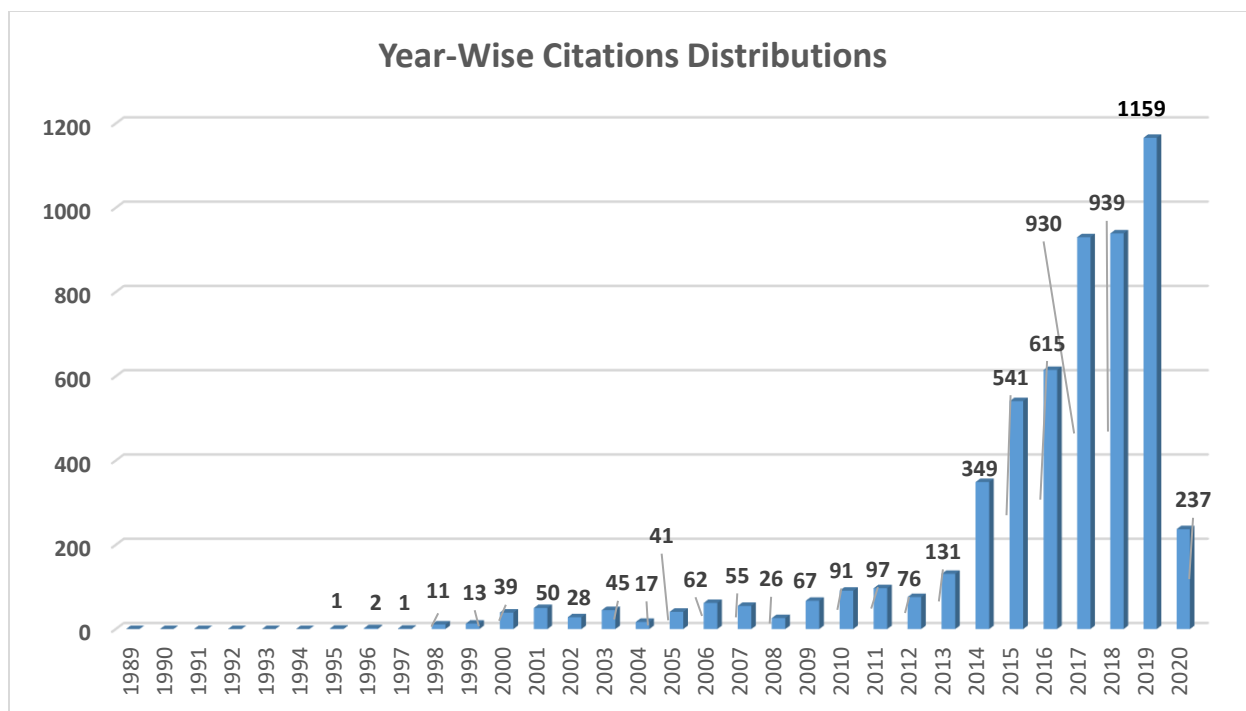
Sharma's core area of research is "photoluminescence", since 2017, he also focused on "latent fingerprints".

2013	2014	2015	2016
<ul style="list-style-type: none"> <li>thermoluminescence 4 papers</li> <li>luminescence 4 papers</li> <li>nanophosphor 3 papers</li> <li>phosphor 3 papers</li> <li>photoluminescence 2 papers</li> <li>combustion synthesis 2 papers</li> <li>x-ray diffraction 2 papers</li> <li>xrd 2 papers</li> <li>b. chemical synthesis 2 papers</li> <li>epr 2 papers</li> </ul>	<ul style="list-style-type: none"> <li>photoluminescence 21 papers</li> <li>phosphor 14 papers</li> <li>thermoluminescence 13 papers</li> <li>nanophosphor 9 papers</li> <li>combustion synthesis 7 papers</li> <li>luminescence 4 papers</li> <li>x-ray diffraction 4 papers</li> <li>optical absorption 4 papers</li> <li>green synthesis 3 papers</li> <li>solution combustion 3 papers</li> </ul>	<ul style="list-style-type: none"> <li>photoluminescence 24 papers</li> <li>green synthesis 11 papers</li> <li>nanophosphor 9 papers</li> <li>luminescence 5 papers</li> <li>solution combustion 4 papers</li> <li>combustion synthesis 4 papers</li> <li>photocatalysis 4 papers</li> <li>thermoluminescence 3 papers</li> <li>phosphor 3 papers</li> <li>cie 3 papers</li> </ul>	<ul style="list-style-type: none"> <li>photoluminescence 15 papers</li> <li>nanophosphor 9 papers</li> <li>solution combustion 4 papers</li> <li>judd-ofelt 3 papers</li> <li>tem 2 papers</li> <li>xrd 2 papers</li> <li>photocatalysis 2 papers</li> <li>cie 2 papers</li> <li>combustion 2 papers</li> <li>fingerprint 2 papers</li> </ul>
2017	2018	2019	2020
<ul style="list-style-type: none"> <li>photoluminescence 11 papers</li> <li>judd-ofelt analysis 4 papers</li> <li>nanophosphor 3 papers</li> <li>latent fingerprint 2 papers</li> <li>latent fingerprints 2 papers</li> <li>aloe vera gel 2 papers</li> <li>anti-counterfeiting 2 papers</li> <li>photocatalytic activity 2 papers</li> <li>pxrd 2 papers</li> <li>sonochemical method 2 papers</li> </ul>	<ul style="list-style-type: none"> <li>photoluminescence 11 papers</li> <li>sweat pores 6 papers</li> <li>latent fingerprint 5 papers</li> <li>latent fingerprints 3 papers</li> <li>ultrasonication 3 papers</li> <li>fingerprint 2 papers</li> <li>rare earths 2 papers</li> <li>solid state lighting 2 papers</li> <li>anti-counterfeiting ink 2 papers</li> <li>characterization 2 papers</li> </ul>	<ul style="list-style-type: none"> <li>photoluminescence 15 papers</li> <li>photometric properties 6 papers</li> <li>thermoluminescence 4 papers</li> <li>latent fingerprints 3 papers</li> <li>sweat pores 3 papers</li> <li>nanophosphor 2 papers</li> <li>solution combustion 2 papers</li> <li>latent fingerprint 2 papers</li> <li>judd-ofelt analysis 2 papers</li> <li>rare earths 2 papers</li> </ul>	<ul style="list-style-type: none"> <li>photoluminescence 2 papers</li> <li>hierarchical architectures 2 papers</li> <li>thermoluminescence 1 paper</li> <li>green synthesis 1 paper</li> <li>latent fingerprints 1 paper</li> <li>photometric properties 1 paper</li> <li>ultrasonication 1 paper</li> <li>sonochemical 1 paper</li> <li>bio-surfactant 1 paper</li> <li>display devices 1 paper</li> </ul>

**Figure-7: Keywords Over Time: Top Per Year**  
 (Keywords Timeline Image is Generated Using ScienceScape Available at <http://medialab.github.io/sciencescape/>)

#### 4.8. Research Impact of Sharma's Publications Through Citations

Citation data is one of the key metrics to assess the impact of research publications. Sharma has published 327 papers as found in the Scopus database since his first publications in 1989. Sharma's 327 papers have received 5563 citations with an average of 17.72 citations per article. The first citation for his paper was received after a six-year gap. Ever since his research papers have received a good number of citations year after year, as shown in Figure 8. Since 2013, his publications have received almost 4941 citations, which amounts to 87.25% of the total citations. It is really staggering for Indian researchers receiving so many citations for his publications. Another reason is that there is a growing interest in the research and development activities of developing countries across the globe (Huang, Chang, & Chen, 2012). As China and India are emerging as major economic powerhouses and also place for many renowned technological firms research and development activities of developing countries, have attract global attention. Open Access for research publication may have also contributed for increased citations for works from developing countries.



**Figure- 8: Year-Wise Citations Received by Sharma's Works**

#### 4.9. Top Ten Highly Cited Articles of Sharma

Table-2 presents Sharma's top ten research publications which have received the highest number of citations. The article entitled "Green synthesis of multifunctional zinc oxide (ZnO) nanoparticles using *Cassia fistula* plant extract and their photodegradative, antioxidant and antibacterial activities" published in *Materials Science in Semiconductor Processing* in the year 2005 has received highest number of citations that is 137. As it can be seen in Table 3 - except "The sliding wear behavior of A16061-garnet particulate composites" published in *Wear*, which is the solo-authored article - all the other articles which have received most citations are collaborative publications. It is notable that, six out of ten most cited papers of Sharma have been co-authored with Naghabhusana H. of C.N.R Rao Centre for Advanced Materials, Tumkur University, Karnataka. Sharma has published highest number of papers with him than any other co-authors.

Most of his highly cited papers have also published post-2000. Sharma's publications have also seen a gradual increase in post-2000 and have risen considerably after 2010. Five of his papers which have received most citations have published post-2005.

SL No	Cited Document (Title)	Author(s)	Journal Name	Publication Year	Number of Citations Received	FWCI*
01	Green synthesis of multifunctional zinc oxide (ZnO) nanoparticles using Cassia fistula plant extract and their photodegradative, antioxidant and antibacterial activities	Suresha, D., Nethravathi, P.C., Udayabhanua, Rajanaika, Nagabhushana, H., & Sharma, S.C.	Materials Science in Semiconductor Processing	2005	137	7.35
02	Evaluation of sliding wear behaviour of feldspar particle-reinforced magnesium alloy composites	Sharma, S.C., Anand, B.V., & Krishna, M.	Wear	2000	111	0.95
03	Effect of calcination temperature on structural, photoluminescence, and thermoluminescence properties of Y2O3:Eu3+ nanophosphor	Hari Krishna R., et al	Journal of Physical Chemistry C	2013	98	4.79
04	The sliding wear behavior of A16061-garnet particulate composites	Sharma, S.C.	Wear	2001	80	0.47
05	Low-temperature synthesis and photoluminescence properties of red-emitting Mg2SiO4: Eu3+ nanophosphor for near UV light-emitting diodes	Ramachandra Naik, et al	Sensors and Actuators, B: Chemical	2014	68	6.88
06	Effective fingerprint recognition technique using doped yttrium aluminate nano phosphor material	Darshana, G.P., Premkumar, H.B., Nagabhushana, H., Sharma, S.C., Prashanth, S.C., & Daruka Prasad, B.	Journal of Colloid and Interface Science	2016	66	4.96
07	Combustion synthesized tetragonal ZrO2: Eu3+ nanophosphors: Structural and photoluminescence studies	Vidya, Y.S., et al	Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy	2015	66	6.71
08	Effect of SiC particle reinforcement on the unlubricated sliding wear behaviour of ZA-27 alloy composites	Sharma, S.C., Girish, B.M., Rathnaka Kamath, & Satish, B.M.	Wear	1997	64	0.89
09	Dry sliding wear of garnet reinforced zinc/aluminum metal matrix composites	Ranganath, G., Sharma, S.C., & Krishna, M.	Wear	2001	62	0.47
10	Particle size, morphology and color-tunable ZnO: Eu3+ nanophosphors via plant latex mediated green combustion synthesis	Chandrashekar, M., et al	Journal of Alloys and Compounds	2014	61	5.91

\* *Field-Weighted Citation Impact (FWCI) is the ratio of the total citations received by the denominator's output, and the total citations that would be expected based on the average of the subject field.*

**Table-2: Sharma's Top Ten Articles with Most Citations**

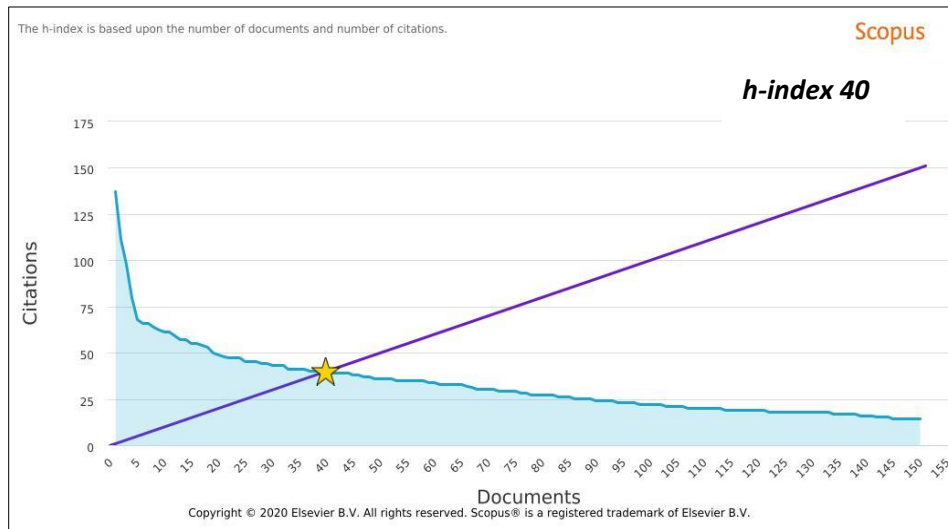
#### 4.10. *h-index* of Sharma

The *h-index* has been proposed by Jorge E. Hirsch, a physicist at the University of California San Diego, to quantify the impact of individual scientists' research output (Cronin & Meho, 2006). The *h-*



index is an index that attempts to measure both the productivity and impact of the published work of a scientist or scholar. This index is based on the set of the scientist's most cited papers and the number of citations that they have received in other people's publications. For example, if Scientist A has an h-index of 20, it means that Scientist A has written 20 papers with at least 20 citations each (Hirsch, 2005). h-index has received considerable attention among researchers, academics and scientometricians (Zhang, Thijs & Glänzel, 2011). H-index is one of the known author-level metrics, which is used in most of the academic institutions for appointments, tenure extensions and funding research projects.

According to the Scopus database, Sharma has 327 publications to his credit, with 5563 citations with an average citation of 17.72 per paper. He has got an h-index of 40 (See Figure-9). It means that Sharma's 40 papers have been cited by 40 times. For an Indian academician and researcher obtaining an h-index of 40 itself is a significant achievement. A very few Indian academicians have an h-index of 40 on the Scopus database.



**Figure-9: h-index of Sharma as Seen in Scopus**

#### **4.11. Comparison of h-index in the Google Scholar and the Scopus Citation Databases**

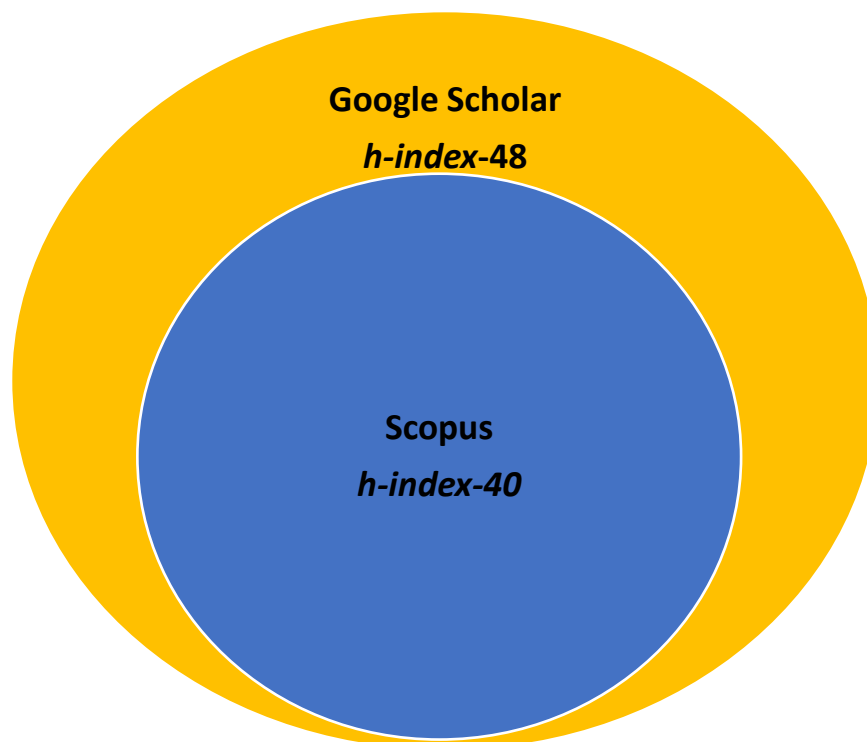


Sharma, apart from publishing a large number of research papers in journals and conference proceedings, has also published and presented papers in various seminars and scholarly forums and has a good number of books, unpublished documents and articles. These publications are generally not covered by the Scopus database. The Google Scholar (GS), a freely available citation database which covers a wide variety of scholarly materials, was searched for citation counts and h-index. It is observed that the GS presents a broader view of the academic world because it has brought to light a considerable amount of sources that were not previously visible (Delgado López-Cózar, Orduna-Malea, & Martín-Martín, 2018).

Features	Scopus	Google Scholar
Number of Documents	327	400
Number of Citations	5663	8586
<i>h-index</i>	40	48
Cites/paper	17.72	21.47
Cites/Year	177	162

**Table-3: Comparison of Sharma's Citations and h-index in the Scopus and the Google Scholar**

It was found that several documents, citations, h-index vary considerably in the GS as compared to the Scopus (See Table 3). Number of citations that found in the Google Scholar is 8586 for 400 documents after excluding the documents and citations that were associated with Sharma. Compared to the Scopus, Sharma's publications have received 2923 citations more in the GS. The GS h-index Wfor Sharma is 48, whereas it is 40 in the Scopus (Figure 10). This difference can be attributed to the vast kind of academic materials that the GS indexes and also the speed in which documents get indexed in its database.



**Figure-10: Sharma's *h-index* in the Scopus and the Google Scholar**

## **5. Conclusion**

This study provides an overview of the publication profile and citation impact of Sharma as found in the Scopus database. Sharma has published extensively in the field of materials science. Interestingly, Sharma has published a large number of papers from 2012 to 2019. Almost 60% of his papers have been published in this period. During this period, he was engaged in one or the other executive posts in academia. In India, executive publishing extensively is rare to be seen. Sharma is one such exception. Many academicians often reject executive positions just because it demands a lot of time and energy to manage the system. But, Sharma has been so far managing both very efficiently and effectively.

Sharma's publications have appeared in high Impact Factor (IF) or high CiteScore journals. The top ten journals which he has published extensively have a CiteScore of 1.00 or more. The high percentage of publications in high impact journals reflects Sharma's research significance. The journals which he has often published includes "Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy" which has a CiteScore of 2.92., "Journal of Alloys and Compounds" with a CiteScore of 4.12, "Materials

and Design" with 6.25 CiteScore and "Materials Research Bulletin" with 2.91 CiteScore are some of the notable examples.

The density visualization of VOSviewer presented in this paper indicates the significant co-authors of Sharma. Nagabhushan H. has co-authored more than 180 papers and his name is presented in the high-density zone. The density visualization of country collaborations also indicates the countries with which Sharma has published his research papers. India, Singapore, United States and Taiwan are the countries with which he has many publications. Sharma has published a significant number of papers in the research areas of photoluminescence, nanophosphor, combustion synthesis, thermoluminescence, latent fingerprints and x-ray diffraction.

Sharma has published 327 papers starting from 1989 to till February 2020. His works have received 5563 citations with an average of 177 citations per year. He has an h-index of 40. On a global h-index threshold if an author is having an index of 20 or more is easily qualified for a fellow of a major professional organization in the field. Indian having an h-index of 40 is very rare. Sharma has an h-index of 48 in the Google Scholar. There is a need to carry out this study using other citation databases such as the Web of Science and Google Scholar. A simple comparison between the Scopus and the Google Scholar carried out in this study provides a significant difference in the number of documents, citations, and h-index. If we further examine these databases with this kind of studies, it may help in better understanding of which citation database best suits in Indian context.

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