

*Invited Paper***Report on TRDNC and TST Updating in SICAST 2011**

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**Abstract:** The latest updating of the website Terahertz Research & Development Network of China (TRDNC) and the international online Journal *Terahertz Science & Technology (TST)* were presented and reported in Shenzhen International Conference on Advanced Science and Technology (SICAST) 2011. Newly achieved functions and merits were also illustrated and analyzed with charts and tables so as to fully prepare TRDNC and *TST* to play a more and more innovative, informative, insightful and instructive role in the future development of Terahertz science and technology at home and abroad.

**Keywords:** TRDNC, *TST*, Updating.

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**1. History briefing**

Established in 2006, TRDNC was initially designed to report the ideas proposed from the Fragrant Hill Conference in 2005. It is the first professional website in China aiming at providing a platform for THz experts and researchers to have a better academic communication in order to promulgate the latest development and insight news as well as the information of THz facilities in this field. Later, in 2007, when SICAST 2007 was held, many experts and scholars proposed that there should be an official journal to collect all the wonderful papers and reports presented in SICAST. Therefore, after months of efforts at home and abroad, the international online journal *Terahertz Science & Technology (TST)* came into being. Registered in the USA with its International Standard Serial Number 1941-7411 and mostly managed and edited by Chinese scholars, this quarterly international professional journal was initiated and its first issue with 6 papers selected from SICAST 2007 was published online in March 2008. A new chapter started!

## 2. New record created in five years

As the first indigenous, professional and academic THz website and journal in China, TRDNC together with *TST* have always been trying to be informative, insightful, instructive and innovative so as to play an important role in bridging the gap between the THz development in the lab and enterprises as well as a window for the government to provide its support for the research and development of THz in the future.

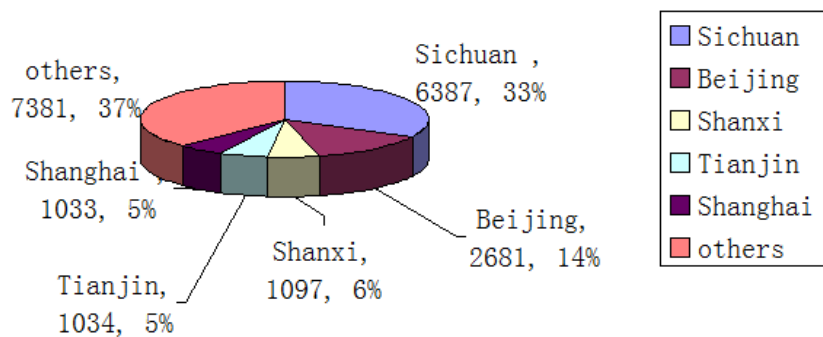
For the past 5 years, TRDNC has experienced amazing website traffic with a total visiting record of more than 109, 900! The average daily access amount is about 50-60 and the daily maximum is about 130! Why does TRDNC attract so many insiders' attention? Besides the fact that *TST* is actually embedded in the website which may definitely increase the access amount, being informative itself must be one of the decisive reasons. Up till this month, TRDNC has reported 634 articles including 89 pieces of local news, 495 inside news, 25 papers for academic exchanges, 22 pieces of conference information, 3 communiqués from THz Research Center in UESTC, and 5 pieces of supply and request information as well as 47 facilities available for consultation. Due to its unique accessibility to the latest happening in THz world, TRDNC has participated in several THz conferences or seminars, and has been actively involved in presentations at the conferences and new reports afterwards, such as the Inaugural Meeting of CIE (Chinese Institute of Electronics) THz Expert Committee in 2006, SICAST 2007 and 2009, the Annual Symposium of CIE THz Expert Committee in 2008, and a series of IRMMW-THz conferences. In 2007, a special collection of featured reports on "THz R&D in China" presented by TRDNC revealed the progress and situation of THz basic research inside China, and promoted the cooperation and exchanges at home and abroad. As to *TST*, since it has just come into existence for about 4 years, up till now, there are 15 issues published. That's 4 volumes, 75 papers and 739 pages totally! The total access amount is about 49, 360 so far and the average daily visiting record is about 40 with the daily maximum about 80-90. Clearly and hopefully, all these figures are the best quantitative proof to convince any THz insider to pay close attention to this informative website and online journal.

## 3. The analysis of visitor composition of TRDNC

From 2010 to 2011, among the gradual growth of visitors, some changes occurred, which might explain more for the development and application of THz science and technology in the future. With the help of website technicians, the IP addresses can be traced down so that the pie chart of Visitor Composition of TRDNC in 2010 can be drawn. The total access amount was 19,550, among which visitors from Sichuan, Beijing, Shanxi, Tianjin and Shanghai topped the first five. Others accounted for a pretty large proportion, 37.43%, and the visitors were from various parts of the world including Chinese provinces of Jiansu, Guangdong, Hunan, Hubei, Anhui, and countries like USA and New Zealand.

Total	19550	100.00%
Sichuan	6387	32.67%
Beijing	2681	13.72%
Shanxi	1097	5.61%
Tianjin	1034	5.29%
Shanghai	1033	5.29%
Others	7381	37.43%

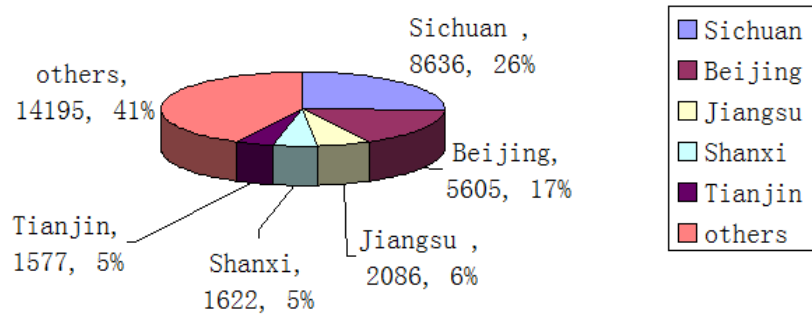
2010 TRDNC Visitor Composition



However, up to 8<sup>th</sup>, November 2011, there were definitely changes of the composition. The total access amount was 33,721, among which visitors from Sichuan, Beijing, Jiansu, Shanxi and Tianjin topped the first five. Others accounted for a very large proportion, 42.1%, and the visitors scattered very widely including Chinese provinces such as Guangdong, Shandong, Shanghai, Zhejiang, Hunan, Hubei, Anhui, and countries such as USA, Germany, Japan and UK.

Total	33721	100.00%
Sichuan	8636	25.61%
Beijing	5605	16.62%
Jiangsu	2086	6.19%
Shanxi	1622	4.81%
Tianjin	1577	4.68%
others	14195	42.10%

2011 TRDNC Visitor Composition



Obviously, the total visits from Sichuan increased from 6387 to 8636, but the percentage, on the contrary, dropped from 32.67% to 25.61%. Meanwhile visits from other provinces, municipalities or countries were dramatically rising, which just illustrates that TRDNC has more and more impact on the THz researchers nationally and internationally.

#### 4. The analysis of key words in searching for TRDNC

According to the statistics of some major online search engines, such as Google, Baidu and Microsoft Bing, the top five key words in searching for TRDNC or other THz websites were:

1. THz, (362 *times*)
2. THz R&D Network, (256 *times*)
3. THz R&D Network of China, (102 *times*)
4. THz, (100 *times*)
5. thz, (52 *times*)

However, in 2011, the top five keys words were:

1. THz
2. Progress and Future of High Frequency Ultra-wideband THz Sources
3. THz Communication
4. THz Imaging
5. THz Antenna

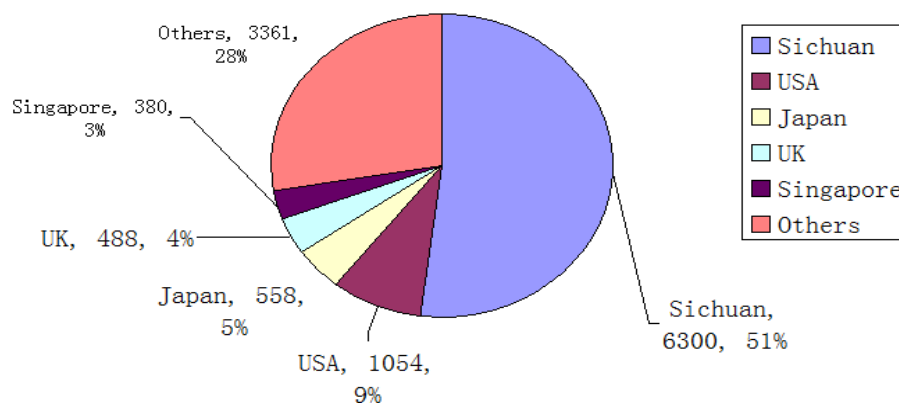
These changes of keywords indicate that the concern for THz S&T is moving to a more concrete and more empirical stage, not just pure theoretical study anymore. Hot key words like “THz Imaging”, “THz Antenna” and “THz Communication” undoubtedly prove the focus and direction of the application and marketization of THz research in the coming decades.

## 5. The analysis of reader composition of *TST*

As an international online journal firstly initiated by the papers presented at SICAST 2007, *TST* has been attracting more and more readers at home and abroad. According to the analysis of nearly all the 50,000 IP addresses of *TST* readers, it can be concluded that the major *TST* readers are mainly from Beijing, Chengdu, Xi'an and Hong Kong inside China and from US, Japan and UK outside China. For instance, the figures in 2010 showed that the top five are Sichuan, USA, Japan, UK and Singapore and nearly 1/3 readers were from Shanxi, Shanghai, Jiangsu and Hubei in China and countries like German, Russia, France, Italy, India and New Zealand, etc.

Total	12141	100%
Sichuan	6300	51.89%
USA	1054	8.68%
Japan	558	4.60%
UK	488	4.02%
Singapore	380	3.13%
Others	3361	27.68%

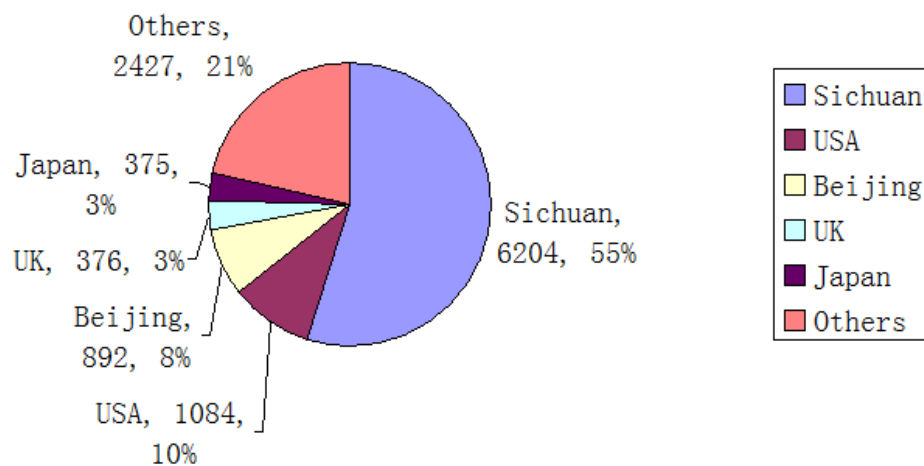
2010 Reader Composition of *TST*



By November 2011, the reader composition of *TST* also underwent some changes based on our data. The top five were Sichuan, USA, Beijing, UK and Japan and a bit more than 1/5 readers were from Shanxi, Shanghai, and Jiangsu in China and countries like Singapore, German, Russia, France, and Italy, etc.

Total	11358	100%
Sichuan	6204	54.62%
USA	1084	9.54%
Beijing	892	7.85%
UK	376	3.31%
Japan	375	3.30%
Others	2427	21.37%

2011 Reader Composition of TST



From the above figures, it can be safely concluded that *TST* has attracted more and more attention not only from domestic readers but also from the developed European and American countries. This is a significant change and a step forward because the goal of *TST* is to bridge the gap and create a platform for better and more professional and academic exchanges among different countries in this field.

## 6. The analysis of key words in searching for *TST*

In addition, we also did something calculation based on the statistics from some major online search engines. The top five key words in searching for *TST* in 2010 were:

1. Terahertz Science and Technology (45 *times*)
2. terahertz network (21 *times*)
3. terahertz science and technology journal (18 *times*)
4. terahertz science and technology (12 *times*)
5. THz (9 *times*)

And the top five in 2011, by the end of first week of November, were:

1. Terahertz Science and Technology (32 *times*)
2. generation of THz comb (19 *times*)
3. journal tst (19 *times*)
4. THz bio-signal invivo (18 *times*)
5. high conversion efficiency THz generating procedure (13 *times*)

Thereafter, it is clear to notice that, like the changes of keywords in TRDNC, the concern on the research of THz S&T definitely is shifted and focused on application in the past years, which means a lot to the industrialization and marketization of THz S&T.

If we dig deeper to the content of the articles in TRDNC, we can also feel the change and the instructive pulse of THz R&D direction. In recent two years, there are 140 articles shared in TRDNC, including news, scientific reports and conference information. Generally speaking, scientific reports enjoy much more concerns from the readers and the following reports with pretty high visiting rates have the best say. For example, in both the English and Chinese versions of TRDNC, some of the highly clicked reports are listed here:

1. 2009-07-21 Graphene, shown to enable tunable photonics, promises light generation from THz to IR (462 *times* in English and 601 *times* in Chinese, 1063 total);
2. 2009-08-04 DARPA's THz Electronics Program: (505 *times* in English and 863 *times* in Chinese, 1368 total);
3. 2009-09-10 THz Waves Measure Nanofilms: (524 *times* in English and 920 *times* in Chinese, 1444 total).

Besides, the following four reports in Chinese also have attracted a lot of attention.

Their Chinese titles are also listed (Originally in Chinese character but here written in Chinese *pinyin* for publication):

2009-9-7, *Taihezi Chaocailiao Xuehui Jiyi* (2009-9-7 THz Metamaterials learn to memorize) 751 times

2009-12-4, *Zhongguo Shiyoudaxue Guangchuguan yu Guangtance Shiyanshi zai Taihezi Jishu Yingyong Lingyu Qude Xinjinzhan* (2009-12-4 New Progress in THz Application Achievement by Optic Sensing and Exploring Lab In China Petroleum University) 1360 times

2010-8-9, *Chaocailiao Zhicheg Gaodingxiang Taihezi Jiguangqi* (2010-8-9 Metamaterials Made Highly Oriented THz Laser) 435 times

2010-9-26, *Meiguo Jichang "Luoti Chengxiang" Saomiaoyi Tisheng Yinsi Guanzhu* (2010-9-26 US Airport Naked Image Scanner Raises Privacy Concern) 692 times

Based on these visiting rates released from TRDNC, we can be easily instructed to understand the practical needs for the R&D of THz S&T. Our website functions as an instructive guide to rally THz researchers around to promote the application in the related fields such as THz imaging and inspection, wideband communication, biomedical treatment, etc. As a result, we can see, in 2010, articles on THz empirical studies such as imaging inspection and THz communication were 18, accounting for 33% of the total. However, in 2011, such articles increased to 29. That's 38% of the total, 5% higher than that of 2010. Therefore, it's safe to announce that the focus of THz research has been instructed from basic theoretical studies to applications, industrialization and marketization.

## 7. Summary

For the past several years, TRDNC and *TST* have been supported and encouraged by numerous scientists and researchers so as to develop into an informative, insightful and instructive website as well as an innovative and important international journal in the field of THz research. It will be the mission for both TRDNC and *TST* to function as a bridge to fill in the gap between the THz development in the lab and enterprises as well as a window for the government to provide its support for the research and development of THz in the future. With more involvement and participation in the related events in THz study, TRDNC and *TST* will be more innovative, inspiring and interactive so as to contribute more for the development of THz science and technology.



**Note:**

This paper is based on the report presented in the 3rd Shenzhen International Conference on Advanced Science and Technology (SICAST) 2011. All the statistics are up to November 2011. The reporter has done minor revision for the publication.