ARTICLES: 156
CORRECTED COUNT: 66.89

South Korea

South Korea increased its NPI research output significantly in 2013, an improvement on a quiet 2012. Increasing government funding for basic research will provide a solid footing.

South Korea's output in Nature research journals rose substantially in 2013. The trend is likely to continue owing to increased investment in scientific and technological research, announced by President Park Geun-hye.

The nation consistently leads the Asia-Pacific for research spending, measured as gross domestic expenditure on research and development (GERD) as a proportion of GDP, and Park's government aims to reach 5% by 2015. The president has said that within five years the proportion of government R&D spending on basic science will increase from 35% to 40%.

Funding for the Institute of Basic Science (IBS), modelled on Germany's Max Planck institutes, is already producing results. In 2013, its first full year, IBS reached eighth place among South Korean institutions in the NPI, propelled by articles from three of its nanoscience research centres. There are plans to open 50 research centres by 2017, an increase from the 13 in operation at the end of 2013. South Korea has traditionally placed emphasis on making improvements and advances on technology invented elsewhere, so the IBS represents a significant shift.

Its top institution, the Korea Advanced Institute for Science and Technology (KAIST), increased its NPI output on the previous year. With focus on IT and bioengineering, KAIST was the most prolific Korean institute in the NPI physical and life sciences. In one of its two *Nature* papers, KAIST scientists reported a novel synthetic biological technique for producing petrol through metabolic engineering of the *Escherichia coli* bacterium. South Korea is strong in biotechnology generally; Seoul National University and KAIST ranked first and third, respectively, in contributions to *Nature Biotechnology* on genetic and metabolic engineering techniques.

Large corporations such as LG and Samsung heavily influence the direction of South Korea's science. Samsung accounts for 17% of the country's GDP and spent US$10.4 billion on R&D in 2012-13, second only to Volkswagen among global research companies. In early 2013 Samsung also announced a ten-year, KRW1,500 billion (almost US$1.4 billion) programme to support basic research in universities.

South Korea topped Bloomberg's Global Innovation Index of 2013, with high scores for its number of patents, manufacturing capability, research spending as a proportion of GDP, and the proportion of high-tech companies. With IT and electronics so important to its economy, it's not surprising that South Korea's NPI publishing record is strongest in the physical sciences, mostly for research with commercial application. Of the country's CC, 11% came from publications in *Nature Materials* and *Nature Photonics*.

SOUTH KOREA TOP TEN

South Korea has 25 institutions in the Asia-Pacific top 200

ASIA-PACIFIC RANK 2013	INSTITUTION	2013 NATIONAL RANK	2013 CORRECTED COUNT	2013 ARTICLES	2012 NATIONAL RANK	2012 CORRECTED COUNT	2012 ARTICLES	2009–13 NATIONAL RANK	2009–13 CORRECTED COUNT	2009–13 ARTICLES
13	Korea Advanced Institute of Science and Technology (KAIST)	1	12.12	23	1	5.46	14	1	34.18	125
20	Seoul National University	2	8.14	37	2	4.60	26	2	26.93	66
22	Pohang University of Science and Technology (POSTECH)	3	7.34	18	3	4.03	15	3	16.97	45
40	Sungkyunkwan University	4	4.87	17	4	3.67	10	4	13.77	42
46	Korea University	5	3.80	12	5	2.62	11	5	12.82	43
49	Samsung Electronics Co., Ltd	6	2.91	7	6	2.43	6	6	10.58	43
73	Yonsei University	7	1.86	13				7	10.37	25
82	Institute for Basic Science (IBS)	8	1.69	9	8	1.95	5	8	7.14	30
84	Ulsan National Institute of Science and Technology (UNIST)	9	1.62	5	9	1.85	6			
87	Hanyang University	10	1.56	9	10	1.67	4			

SOUTH KOREA 2013

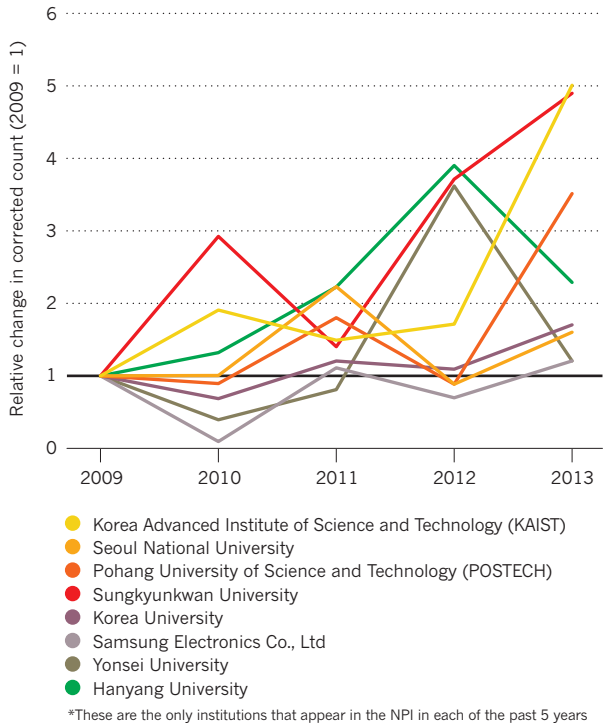
POPULATION:	48.6 M
RESEARCHERS:	264,118

SOURCE: UNESCO

Yet *Nature Communications* was the journal in which South Korean scientists were most prolific. It accounted for almost half of the country's NPI publications (72 out of 156), including the report from Samsung scientists and colleagues from four other institutions who created an electrically controlled graphene switch which can be used in developing superconducting quantum information devices. New funding will consolidate graphene, the atom-thick sheets of carbon, as one of South Korea's key strengths. The Korean Graphene Project will receive KRW49 billion (US$46 million) to commercialize technologies; and there are plans to build two new IBS institutions focusing on the science of graphene and related 2D materials. One of these will be hosted at Sungkyunkwan University, which is heavily financed by Samsung. These two institutions top the list for graphene-related patents globally. Sungkyunkwan scientists published three graphene papers in Nature journals in 2013, and, in January, Samsung demonstrated flexible graphene touchscreens that could be used for small devices such as mobile phones. ■

INSTITUTIONAL PUBLISHING TRENDS

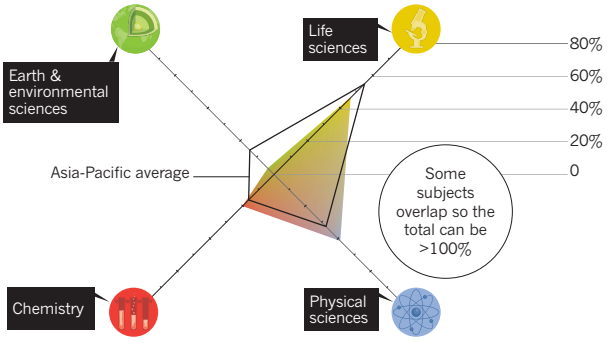
Charting the changes in output from the top institutions* since 2009.



*These are the only institutions that appear in the NPI in each of the past 5 years

RESEARCH STRENGTHS

The subject areas in which South Korea achieved its corrected count.



ARTICLES: 116

CORRECTED COUNT: 41.52

Singapore

Singapore's boasted a 3.7% GDP increase in 2013 — and its science output grew too. The island nation's 2013 NPI research output was almost double that of the previous year.

As a small, resource-poor nation, Singapore relies on its acumen to support the country's high standard of living. In this respect it resembles Switzerland, both countries consistently rank in the top ten of the Global Innovation Index of the World Intellectual Property Organization and Cornell University. The World Economic Forum ranks Singapore second to Switzerland in its 2013 list of the world's most competitive economies. Hong Kong and Japan are the other Asian representatives in the top ten.

In the past, this relentless drive for innovation has hindered Singapore's climb up the NPI. Applied research, geared towards projects that can quickly be translated into products or those that solve immediate problems, has not traditionally been published in Nature journals. And, when research is driven by high levels of international collaboration, as has usually been the case for Singapore, the contribution to corrected count is diluted.

But times are changing. The addition of *Nature Communications*, which encourages submissions in fields that aren't covered by other Nature journals, has provided more scope for publishing research from countries with Singapore's strengths. Almost 40% of all NPI papers involving authors from Singapore's top two institutions, the National University of Singapore (NUS) and the Nanyang Technological University, appear in that journal.

RESEARCH STRENGTHS

The subject areas in which Singapore achieved its corrected count.