

China's Innovation Landscape

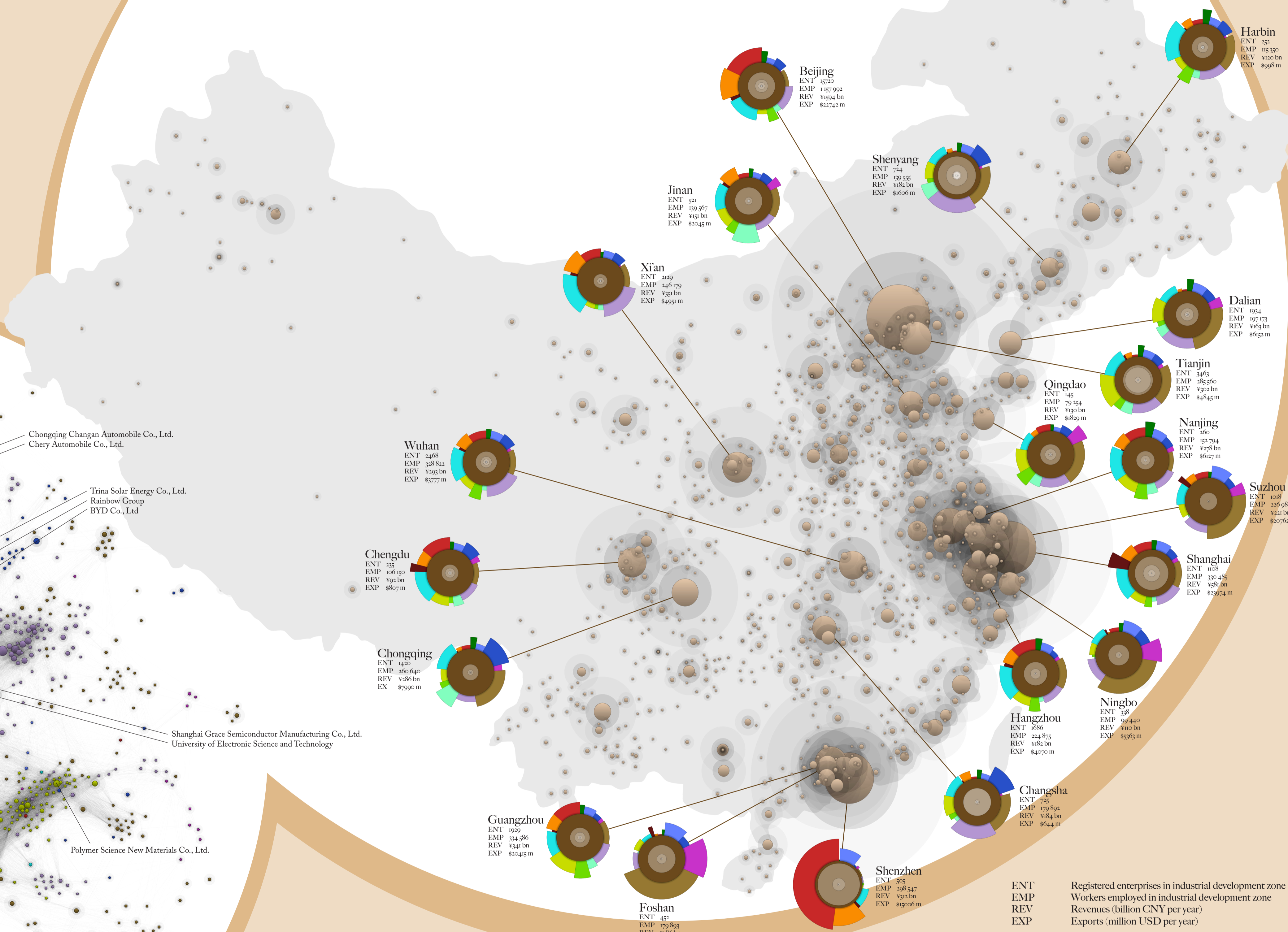
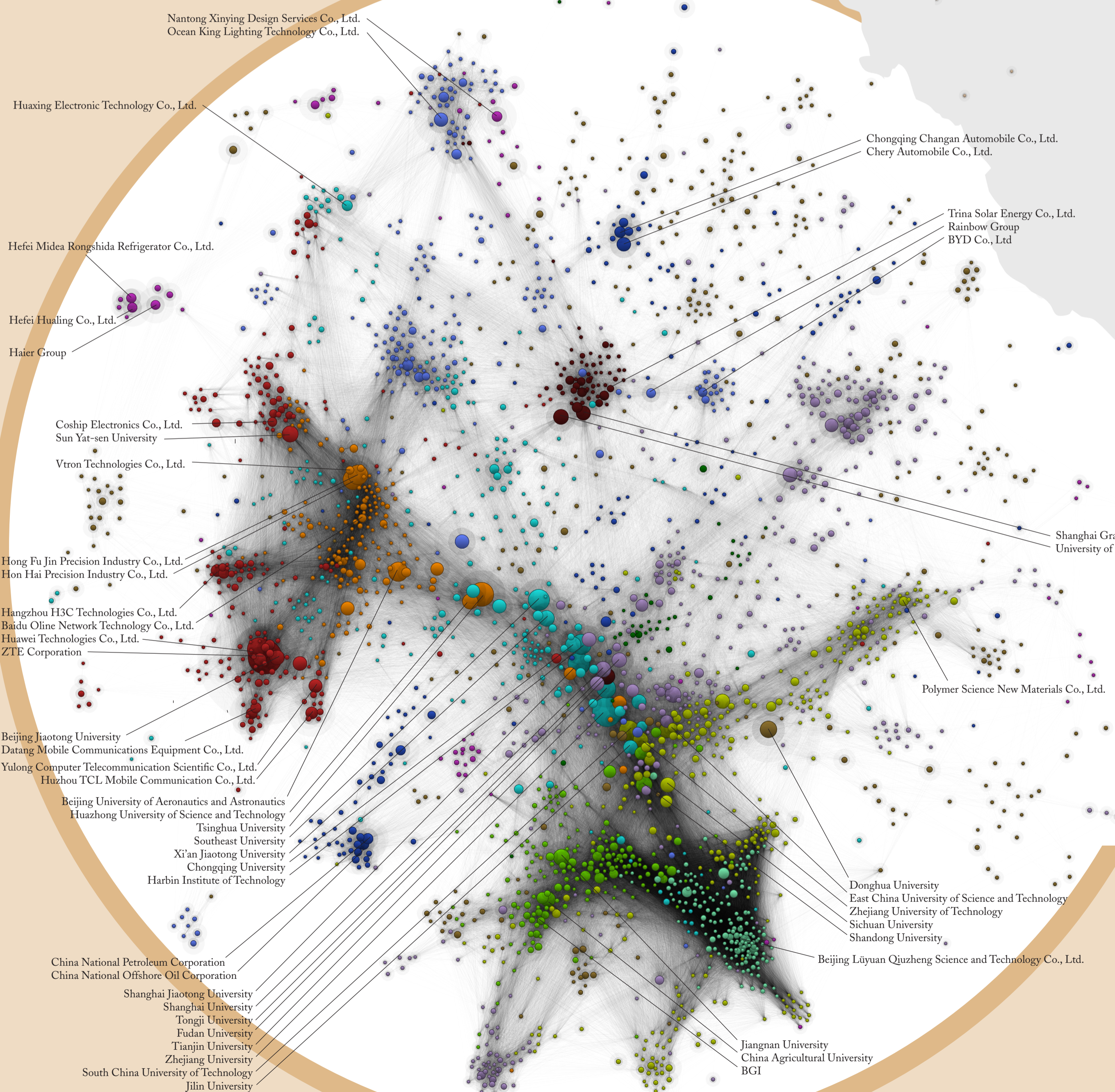
1986 1989 1992 1995 1998 2001 2004 2007 2010

Kairos Future has charted the innovation landscape of China to understand where this emerging technological super power is heading. This has been possible by analyzing the complete database of Chinese invention patent applications and grants from the State Intellectual Property Office of China, from 1985 to today. In 2011 alone, Chinese invention patents surpassed 170,000.

The map to the right shows the geography of Chinese research and development (R&D) based on patent applications with Chinese priority since 2010. Each spot marks a city that has filed patents during this time, with the size of the spot reflecting the number of applications. The landscape is clearly dominated by the Bohai Economic Rim, the Yangtze River Delta, and the Pearl River Delta. Second-tier cities across China are also large and growing hubs of innovation. The growth pattern and a breakdown of patents by sector are presented for 20 major cities.

The map below is conceptual rather than geographical. Each dot represents a patent holding entity, be it a corporation, university, or research institute. Out of a total of more than 40,000 entities, the 2,500 most prolific were selected. They were then arranged in the pattern below by network simulation. The bonds pulling entities together reflect shared competencies, defined by the international patent classifications of their patents. The map is color coded by largest sector (refer to legend on the far lower right), revealing a central 'spine' in the Chinese competency infrastructure, built around the major universities. It goes from pharmaceuticals and biotechnology, via inorganic chemistry and materials, through fine instruments, to computers and telecommunications.

For more information, please visit www.chinamapofinnovation.com.



<p>ZTE CORPORATION, a telecommunications equipment and network solutions provider, attained in 2011 the No. 1 global ranking for PCT patent filings. Most of them were related to LTE/3G, cloud computing and the Internet of Things. The company employs more than 30,000 researchers and runs 15 research centers globally.</p>	<p>HUAWEI, a global information and communications technology solutions provider, ranked No. 3 globally in PCT filings in 2011. The company is innovating to improve capabilities in cloud computing, data centers, network solutions, and mobile devices. It invests 10% of its annual revenues into R&D, employing 62,000 researchers.</p>	<p>CHERY AUTOMOBILE is a state-owned car and components manufacturer with an annual production capacity of 900,000 cars. The company has filed patents in new energy vehicles, turbocharged gasoline direct injection, double variable valve actuation, and continuous variable transmission. Its R&D team has more than 6000 members.</p>	<p>BAIDU is a web services company with 80% of China's internet searches and a 30.5% share of the country's online ad market. It spends a tenth of its revenues on R&D and is the largest employer of graduates from China's top academic institutions. Areas of R&D include language processing for Asian languages, mobile search, 3D mapping, and "box computing".</p>	<p>BYD is a manufacturer of automobiles and rechargeable batteries that counts Warren Buffett among its investors. It has developed techniques for making mobile phone batteries at room temperature and is innovating in lithium iron phosphate battery technology, charging mechanisms, and electric cars and buses.</p>
<p>CNOOC GROUP (CHINA NATIONAL OFFSHORE OIL CORPORATION) is a state-owned oil company. Its main areas of R&D are recovery ratio enhancement, geophysics, deepwater engineering, and heavy oil utilization. It also invests in research on coal gasification, coal to liquid technology, and renewable energy.</p>	<p>GRACE SEMICONDUCTOR MANUFACTURING CORPORATION is a semiconductor foundry based in Shanghai. The company specializes in integrated circuit fabrication and pursues R&D in logic, memory, RF, and power management technologies. In December 2011 it merged with Hua Hong Semiconductor Ltd. to form a stronger competitor against Taiwan rivals.</p>	<p>VTRON TECHNOLOGIES LTD., headquartered in Guangzhou, is a manufacturer of video-wall systems and interactive digital boards. The company's R&D focus includes glass ultra contrast screen technology, infrared finger touch technology, and distributed super high-bandwidth video streaming. It dedicates 8% of its revenue to R&D.</p>	<p>BGI is the world's largest genome sequencing center. The company has mapped the genomes of everything from rice and soybean to 40 different strains of silkmoths and the giant panda. It employs over 4,000 scientists and technicians and has amassed patents covering agricultural, industrial, and medical applications.</p>	<p>TRINA SOLAR LTD. is a manufacturer of silicon solar panels. In order to make solar energy increasingly competitive, it is investing 5% of its annual revenue in R&D activities and has started to collaborate with the Massachusetts Institute of Technology. Recent R&D efforts have sought to increase the efficiency of polycrystalline silicon solar cells.</p>

- Digital & telecommunications
- Computers
- Semiconductors
- Optics, measurement, instruments
- Organic chemistry, polymers
- Biotechnology
- Pharmaceuticals
- Inorganic chemistry, metallurgy
- Industrial machinery
- Consumer goods
- Transport & civil engineering
- Electrical machinery, energy
- Environmental technology

ENT Registered enterprises in industrial development zone
 EMP Workers employed in industrial development zone
 REV Revenues (billion CNY per year)
 EXP Exports (million USD per year)