Hangzhou

Hangzhou, a tourist hotspot best known for its historical relics and natural scenery, has long been a source of inspiration for Chinese artists. Today the city is home to a new generation working at the intersection of science and e-commerce.

ARTICLE COUNT (AC): 377
FRACTIONAL COUNT (FC): 178
WEIGHTED FRACTIONAL COUNT (WFC): 178

Hangzhou, an important manufacturing base and East China's regional logistic hub, is fast becoming the world's largest e-commerce centre. The city is home to the Alibaba Group, China's leading e-commerce service provider with more than 300 million customers and an estimated market value of US$231 billion. In September 2014, Alibaba raised US$25 billion from its initial public offering (IPO), making it the largest IPO in US history.

The presence of this commercial giant is shaping local infrastructure. In 2008, Alibaba and Hangzhou Normal University (HZNU) co-founded Alibaba Business College, a centre for education and training on e-commerce, data mining and modern logistics. And in 2013, they established the Alibaba Research Center for Complexity Sciences for research into econometrics and the physics of complex systems. The college has already published several papers in scientific journals.

Hangzhou's weighted franctional count (WFC) and franctional count (FC) are the same, which shows the city has no astrophysical research. It does, however, have several institutions engaged in other areas of physical sciences. The most famous is Zhejiang University (ZJU), which is the city's largest contributor to the Nature Index, and sixth overall in China by WFC — a measure of the relative contribution of an institution to the papers it has published. In 2013, ZJU published 289 articles (WFC = 150.4), accounting for 85% of the city's WFC (see 'City WFC breakdown'). In addition, ZJU has a strong representation in *Nature* and *Science* journals, with seven articles (WFC = 1.7) representing 1.1% of its WFC — well above other Hangzhou institutions.

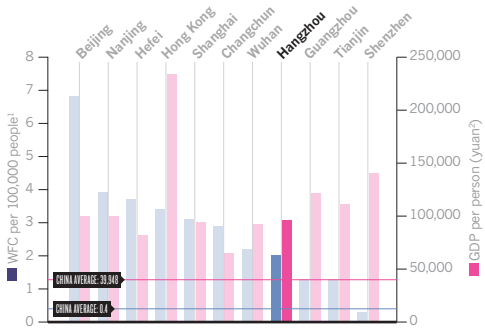
ZJU is strong in both chemistry and the physical sciences. Feihe Huang from the department of chemistry was the largest contributor in this field, with a total of 14 papers (WFC = 13.1) in a range of journals. Last year in particular, his paper "A supramolecular cross-linked conjugated polymer network for multiple fluorescent sensing" — published in *Journal of the American Chemical Society* — was listed by the Institute of Scientific and Technical Information of China as one of 'China's top 100 most influential academic papers' in 2013. "We have developed a special polymer that fluoresces in the presence of ammonia," says Huang. The technology can be used to detect gas leaks in refrigeration systems among other applications, he explains.

Chao Gao from ZJU's department of physics was the largest contributor in the physical sciences. Last year, Gao published three articles (WFC = 3) on graphene and carbon aerogels in the journal *Advanced Materials*. "Our carbon aerogel, with a density of 0.16 mg/cm, is currently the lightest material in the world," says Gao, adding that this ultralight, porous, synthetic material has potential applications in thermal insulation, oil adsorption and gas sensing.

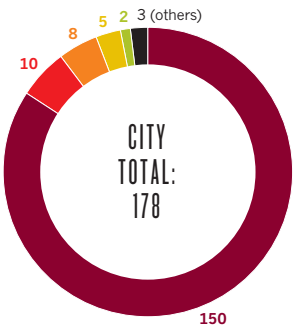
Hangzhou is also home to HZNU, a smaller and younger university specializing in education, literature and mathematics. The institution contributes approximately 5% of the city's WFC. According to the index, HZNU is strong in both physics and chemistry. Zhifang Li from the laboratory of organosilicon chemistry and material technology is HZNU's largest contributor in chemistry. Li led two articles (WFC = 2) on silylenes — highly reactive intermediates to which a broad range of functional groups can be added. Zujin Zhao from State Key Laboratory of Luminescent Materials and Devices is another top contributor, with two articles in the index (WFC = 1) on novel luminescent materials. "We showed that by decorating a tetraphenylethene core with four aromatic groups, the material displays enhanced emission and fluorescence efficiencies," says Zhao. The finding has implications for the development of organic light-emitting diodes. ■

HANGZHOU ANALYSIS

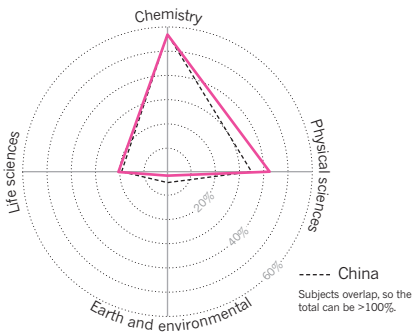
Hangzhou data
Hangzhou's relative prosperity doesn't translate into a high WFC per person.



City WFC breakdown
Zhejiang University is Hangzhou's dominant research institution in the index.



City subject spread
Hangzhou's subject spread is similar to China's with a focus on physical sciences.



Zhejiang University | Hangzhou Normal University | Zhejiang University of Technology | Zhejiang Sci-Tech University | China Jiliang University

1. 360doc.com; 2. cnpop.org; yuan = US$0.16