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In China on the Yangtze River is realised Yangtze Three Gorges Project for launch the biggest hydropower-complex plant in the world (you can see it being under construction on the one of the small photo on the cover). The dam is located in the areas of Xilingxia gorge, one of the three gorges of the river, which will control a drainage area of 1 million km^2, with an average annual runoff of 451 billion m^3. The open valley at the dam site, with hard and complete granite as the bedrock, has provided the favourable topographical and geological conditions for dam construction. The idea started in 1918, when Mr. Sun Yat-Sen suggested a scheme to "improve the upstream from here", that is "a dam should be set here to let ships go downstream and use the water resource as power." In May 1945, Dr. John Lucian Savage, a famous American expert in the dam construction put forward his *Preliminary Report on Development Plans of Three Gorges*. On 3rd April 1992, The Resolution to Construction of Three Gorges Project was adopted at the 5th meeting of the Seventh People's Congress, which indicates that the project entered in to the executive process from legislative process. On 14th December 1994, the *Three Gorges Project* was officially started. On 1st June 2003, the reservoir began its storage, the water reached 135 m on 10th June and 139 m on 5th November. On 10th July 2003, the first generator unit began generating and connected to power grid. On 18th June 2003, the ship lock started to be open to all sorts of ships and on 8th July 2004, the double-way and five-step ship lock passed acceptance by an official group (water level between 135-139 m). At 8:00 am on 8th September 2004, Three Gorges Project experienced flood of 60500 m^3/s, the third largest autumn flood in Yangtze River history. This is the first time the project demonstrates its function of flood control by using modernised water regime forecast and monitoring means and scientific reservoir dispatching method, which succeeded withholding flood of 0.5 billion m^3 in the reservoir while assuring the project safety, normal construction and power generating. On 25th April 2005, the 12th generator unit began generating. Till 30th June 2005, Three Gorges power plant produced totally 68.1 TWh, which wields a powerful function to relieve the pressure of national electricity gap, and a big promotion to the shape of national interconnection with trans-regional transmission. Since the Three Gorges Project was initiated, 1.23 million residents in the Three Gorges Project reservoir area have been relocated and resettled, among which Chongqing relocatees account for 80% approximately. Since 1993 till now the relocation project of the Three Gorges Project has been implemented in three phases and relocated and resettled 1.23 million relocatees, including 0.98 million relocatees from Chongqing Municipality and 0.25 million from Hubei Province. To meet the requirements of the Three Gorges Project construction, the relocation of the rest residents in the Three Gorges Project reservoir area will be completed by 2008.

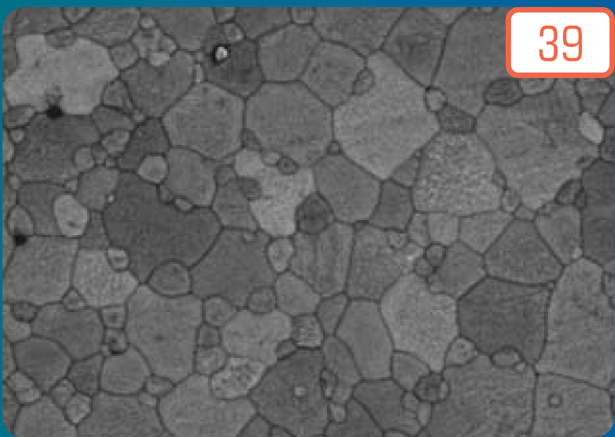
The impoundment at elevation 156 m of the Three Gorges Project reservoir was launched at 22:00 on 20th September 2006. After the Three Gorges Project reservoir impounding to 156 m, the flood control capacity was to increase to 11 billion m^3; the generating capacity of units was to reach the rated value, 700 MW; the length of the improved navigation channel was to increase 140 km compared with that of elevation 135 m operation stage. The benefits of the Three Gorges Project, namely, flood control, power generation and navigation improvement were further brought into full play. Although the Three Gorges Project Reservoir is not the reservoir with the biggest capacity in the world, its reserved flood control capacity can help cut flood peak by 27,000~33,000 m^3/s, the biggest for a water conservancy project in the world. When the Three Gorges Project is completed, the flood control standard of the middle and lower reaches of the Yangtze River, especially the Jingjiang Section, will be largely upgraded from the present level of preventing under-10-year floods to that of preventing 100-year floods. The maximum flood discharge capacity of the dam is 116,110 m^3/s, the biggest in the world. So 15 million people and 1.5 million hectares of farmland in the Jianghan Plain are relieved from flood threats, and devastating plagues of massive death caused by big floods are avoided. The construction of the main body of the Three Gorges Water Conservancy Complex includes the following work: rock-and-earth excavation of 102.83 million m^3, concrete placement of 27.94 million m^3, rock-and-earth refill of 31.98 million m^3, metal frame installation of 256,500 tons. Except the index of rock-and-earth refill, all the preceding indices are the biggest among water conservancy projects which are already built or under construction. The following indices of the Three Gorges ship lock are the biggest in the world: total water head of 113 m, inland river ship lock of five stages, a lock chamber's effective dimension of 280 m x 34 m x 5 m (length x width x minimum water depth on the sill), inland river ship lock with capacity to accommodate 10000-tonnage fleets, maximum operating water head 49.5 m for a gate of its water exchange system, maximum water fill/discharge amount of 260,000 m^3, maximum side slope excavation of 170 m, in height. The operating water head exceeds the world record. The Three Gorges Hydropower Plant contains twenty-six turbine-generator units, each with installed capacity of 700 MW, not including six additional 700 MW units in the Right Bank Underground Powerhouse being under construction. Its total installed capacity amounts to 18,200 MW, and its expected annual average power generation accounts up to 84.7 TWh, so the Three Gorges Hydropower Plant ranks the biggest one in the world with remarkable power generation benefit.

It is worth paying attention to the fact that water energy produced by hydroelectric power plants is not connected with any unuseful influence on the carbon dioxide emission and the creation of greenhouse gas. Obviously, it is not a value to be overestimated. Sometimes the huge amounts of water energy are not or even cannot be used for economic aims. However, numerous falls delight with its beauty and create unrepeatable expression. Not rarely because of that they are National Parks, legally protected as Heritage Sites. As for example Niagara Falls, which you can see on the one of the small photos on the cover, is a set of massive waterfalls located on the Niagara River in eastern North America, on the border between Canada and the United States. Niagara Falls comprises three separate waterfalls: the Horseshoe Falls (Canadian Falls), the American Falls, and the smaller, adjacent Bridal Veil Falls. The Falls are located 123 km from downtown Toronto, Canada when using roads and 26 km away from the Buffalo, USA. The Falls formed after the receding of the glaciers of the most recent Ice Age, as water from the newly formed Great Lakes carved a path through the Niagara Escarpment en route to the Atlantic Ocean. While not exceptionally high, Niagara Falls is very wide and it is the most powerful waterfall in North America. Niagara Falls are a valuable source of hydroelectric power for both Ontario and New York states. Preserving this natural wonder from commercial overdevelopment, while allowing for the needs of the area's people, has been a challenging project for environmental preservationists since the 1800s. A popular tourist site for over a century, the Falls are shared between the twin cities of Niagara Falls, Ontario in Canada and Niagara Falls, New York in USA. The First Lady - Eleanor Roosevelt reportedly exclaimed "Poor Niagara!" upon seeing Iguacu Falls, located on the Iguacu River on the border of the Brazilian state of Paraná and the Argentina province of Misiones. The name Iguacu comes from the Guarani words *y (water)* and *guasu (big)*. The waterfall system of the Iguacu Falls consists of about 270 falls along 2.7 kilometres.

Cover story – continued

Some of the individual falls are up to 82 metres in height, though the majority are about 64-metre-high. The *Garganta do Diabo* or Devil's Throat, a U-shaped 150-metre-wide and 700-metre-long cliff, which you can see on the photo below, is the most impressive of all. The falls are shared by the Iguaçu National Park (Brazil) and the Iguazú National Park (Argentina). These parks were designated UNESCO World Heritage Sites in 1986 and 1984, respectively. Vastly larger than North America's Niagara Falls, the Iguacu Falls is rivalled only by Southern Africa's Victoria Falls which separates Zambia and Zimbabwe (this is excluding extremely large rapid-like falls such as Livingston de Chutes and Boyoma Falls). Whilst Iguacu is wider because it is split into about 270 discrete falls and large islands, Victoria is the largest curtain of water in the world, at over a 1.6 km wide and over 108 meters in height. The water falling over Iguacu in peak flow has a surface area of about 400,000 m^3 whilst Victoria in peak flow has a surface area of over 550,000 m^3. Niagara has a surface area of under 183,000 m^3 only. Victoria's annual peak flow is also greater than Iguacu's annual peak – 9.1 million l/s versus 6.5 million l/s – though in times of extreme flood the two have recorded maximum water discharge 12 million l/s. Niagara's annual peak flow is about 2.8 million l/s, although an all-time peak of 6.8 million l/s has been recorded.

Selected materialographical photo



The paper entitled "Microstructural and electrical conductivity properties of cubic zirconia doped with various amount of titania" by S. Tekeli, A. Akçimen, O.Gürdal and M. Gürü on a **page 39** demonstrates that the a dopant concentration higher than the optimum may reduce the number of mobile oxygen ions because of defect association causing conductivity degradation. The measurement of electrical conductivity is one of the important requirements for the electrolyte in solid oxide fuel cells. Generally, the ac impedance of an ionic conductor contains the contributions from grain, grain boundary and electrode-electrolyte interface at high, intermediate and low frequencies, respectively, which can be reflected in a complex plane by three successive arcs. The experimental results showed that when the TiO_2 amount was less than 5 wt %, the specimens were entirely single cubic phase; further addition of TiO_2 (5 wt% or more) destabilized cubic zirconia phase and caused the formation of tetragonal phase. Grain size measurements for undoped and TiO_2 doped cubic zirconia specimens showed that grain size decreased with increasing TiO_2 content. The electrical conductivity of TiO_2 doped cubic zirconia decreased with increasing TiO_2 content and increased with increasing test temperature.

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