

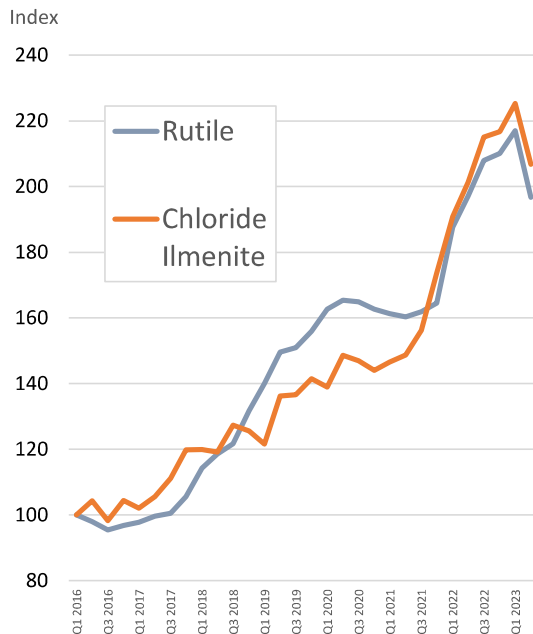
Titanium sponge production cost outlook

- Upward pressure on production cost might be eased for now, however, pressure might be going to increase again.
 - The demand for Titanium dioxide pigment declines, which makes Titanium feedstock prices decrease in 2H 2023.
 - Lower feedstock prices might continue for more than a year, but it is expected to start increasing when pigment demand recovers.
 - The shortage of Titanium feedstock supply and the future pigment demand increase will push feedstock prices up in the near future.
 - The Japanese electricity cost drastically increased last year due to the rise in LNG and oil prices. The cost is decreasing in 1H 2023, however, it can increase when fuel prices rise again.



Titanium feedstock and Japanese electricity cost

Titanium feedstock price



(source: world trade data)

Japanese Electricity Cost Index

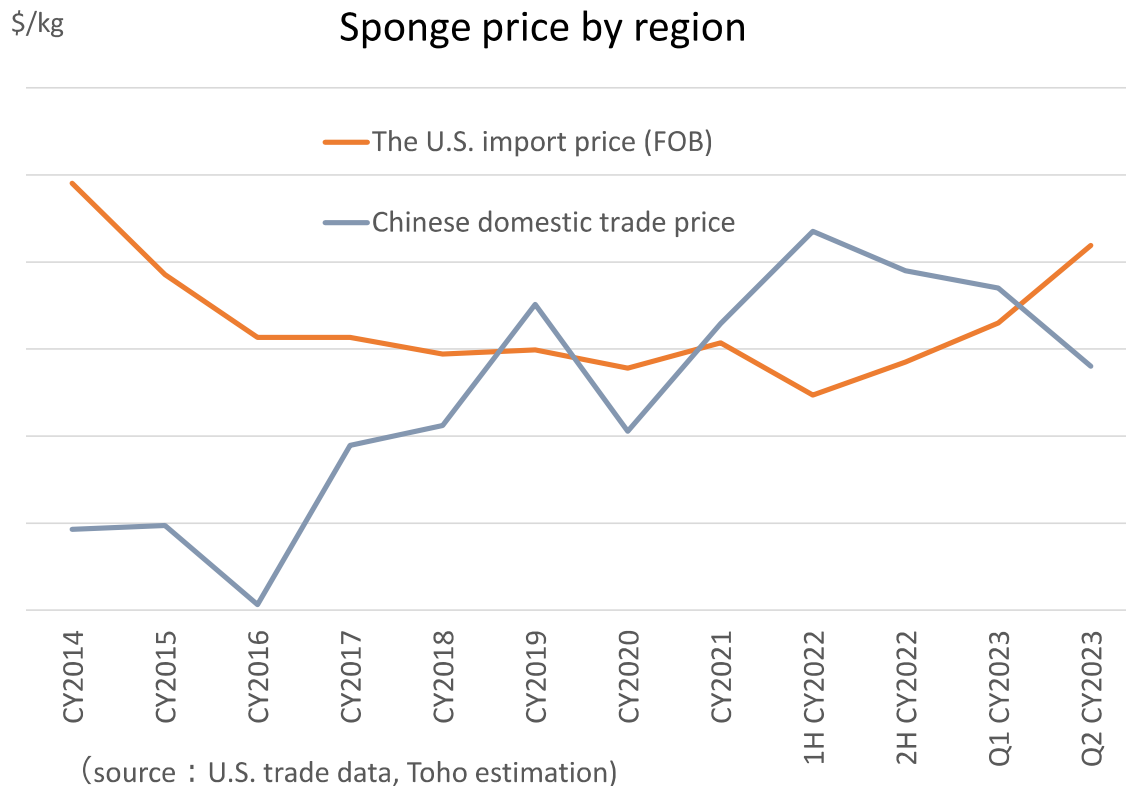


(source: Bank of Japan)

- Feedstock prices started decreasing in Q2 2023 due to the slow demand in pigment market.
- It is hard to estimate prices in 2H 2023 and 2024. However, it can be argued that pigment business cycles and a feedstock supply shortage can make feedstock price rise in the future.
- The Japanese electricity cost is closely linked with oil and LNG prices and supposed to be more unstable considering the current fuel market.



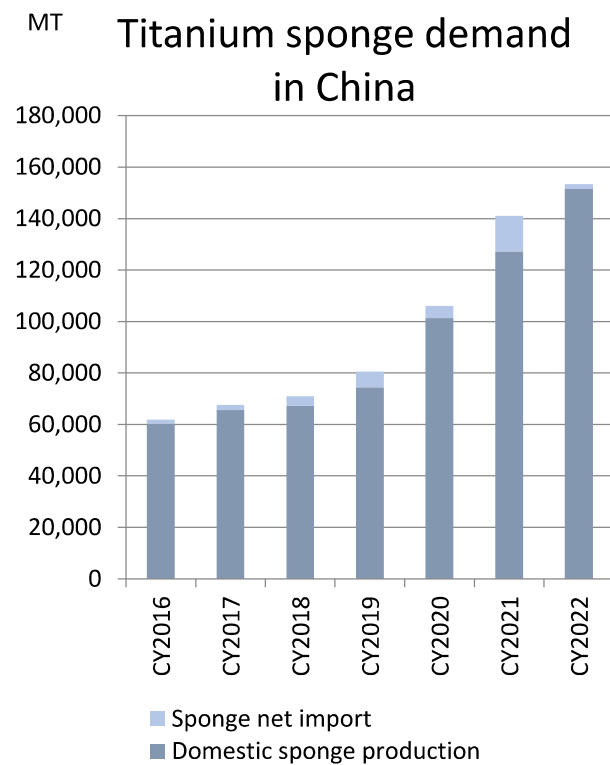
Titanium sponge price



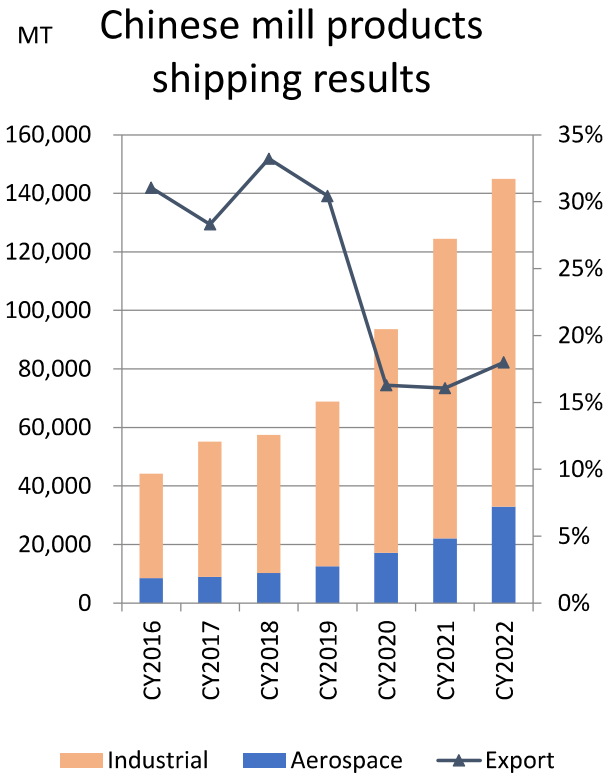
- General sponge usage;
U.S. : Aerospace
China : Industrial
- The U.S. sponge import price started rising up in 2023. According to Japanese export statics, the U.S sponge import price will keep increasing.
- Chinese sponge price, which exceeded the U.S one in 2022, has been falling down this year and hit the CY2015 level in August.



Chinese Titanium industry outlook



(source : Toho estimation, China import data)



(Toho estimation)

- Chinese sponge demand has grown for last several years and Chinese sponge suppliers have increased their sponge production until 1H 2023.
- It is not shown in this graph but Chinese sponge suppliers start reducing their sponge production due to the Chinese sponge market price decline.
- Chinese Titanium products have relied on the Industrial market until now.



Chinese Titanium sponge industry situation

- China's sponge industry has kept growing since 2016, however, further growth might not be assured.
 - The Chinese sponge industry relies on Industrial market, whose growth rate is considered to be lower than Aerospace market.
 - Excessive sponge production might bring about a price decline. Also sponge demand reduction followed by Industrial market maturity can cause the sponge price to fall although new Titanium applications like a smart phone are being developed.
- Chinese sponge is hardly supplied to Aerospace market due to geopolitical risk, however, their excessive sponge might have some influence on the world Titanium industry.



Sponge supply increase possibility

- Sponge suppliers for Aerospace plan to increase production capacity on a small scale. It isn't sure if they can afford to invest in a large-scale new sponge facility as the capex would be hundreds of millions of dollars and profitability is uncertain.
- Concerns for geopolitical risk will prevent the Russian supplier from returning to Aerospace market again for more than 10 years.
- New sponge suppliers won't appear due to the huge capex for new sponge.
- It is not sure if OEMs will dare to try Chinese sponge ignoring geopolitical risk and quality uncertainty.



Titanium sponge outlook – demand and supply

- Sponge supply will be more critical if OEMs try to put their ramp-up plan into practice.
 - Aerospace supply chain will face a sponge shortage as well as its own production ability.
- The sponge demand and supply gap will keep increasing even if OEMs ramp up production gradually.
 - Continuous sponge supply expansion might be a must to reduce the gap.
 - The supply chain also needs to understand a large-scale investment normally requires 3 or 4 years construction.
 - A shift of sponge allocation from Industrial market to Aerospace market might occur to catch up with increasing demand.



Titanium sponge outlook – cost and price

- Sponge production cost may decrease temporarily thanks to the feedstock price and electricity price reductions.
- The sponge price might be steady or keep increasing against production cost decline with the following reasons;
 - Sponge suppliers are afraid that costs may drastically rise again.
 - Sponge suppliers expect a shortage of sponge supply will increase sponge prices continuously even though production costs fall. Sponge suppliers need to gain enough profit for new investments!
- The aerospace supply chain will secure enough sponge that they need if they can accept a reasonable sponge price!



Thank you

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