



Technology Evolving: The Burgeoning Market for Smart Coatings

In the next few years, smart coatings will take a great leap forward in “smartness,” as many relevant R&D programs begin to produce viable commercial products. The smartness of coatings is, in fact, now reaching a point where they are going to be (1) much more useful than ever before and (2) much longer lived. Both these trends will open up new addressable markets for smart coatings -- a class of coatings that include self-healing, self-cleaning, self-layering coatings and other coated smart materials.

Biggest and Fastest Growing

According to NanoMarkets’ latest report on this topic (see: http://nanomarkets.net/market_reports/report/smart-coatings-markets-2015-2022) sales of these high value-added products will reach well over \$600 million this year ramping up to \$5.8 billion by 2020. This represents average annual growth of around 57 percent compared to 2015. A few market segments are going to do a lot better than this.

For example, according to NanoMarkets estimates, the consumer electronics industry will be the fastest growing consumer of smart coatings. Today consumer electronics uses hardly any smart coatings, but purchases of such materials will generate \$225 million by 2020, with much of those revenues being derived from self-healing coatings designed to combat scratches and other physical damage, as well as a variety of coatings designed to improve human-computer interfaces (HCIs) such as touch screens.

Another rapidly growing sector is comprised of self-dimming glass and film used for smart windows in cars, aircraft, and buildings. In fact, the construction industry is expected to be by far the largest user of smart coatings. In 2020, NanoMarkets anticipates that it will utilize \$2.4 billion in smart coatings (40 percent of the entire smart coatings market with much of those revenues coming from self-cleaning coatings).

Futures: Multilayer Coatings and the IoT

As we have noted, this rapid growth will be supported not just a surge in demand for highly functional coatings but also by the emergence of entirely new kinds of smart coatings. In particular, we think that two trends will be especially important: the emergence of multilayer smart coatings and a growing role for smart coatings in the Internet-of-Things



Multilayer coatings: Complex functionality can be designed into smart coatings using multilayer coatings – each layer having a different functionality. One might imagine in the future, for example, a smart coating that provides photovoltaic energy generation with inherent self-repair and self-cleaning capabilities. But whatever the functionality of multilayer coatings, we think cost will be a factor holding back the development and use of these sophisticated smart coatings.

Smart coatings and the Internet-of-Things: Meanwhile, NanoMarkets believes that smart coatings and the IoT will be a perfect fit. As we see it smart coatings may do a lot more than just complement sensors in the IoT. They can compete with IoT sensors directly since some stimuli-responsive coatings can act directly as a sensor. A smart coating that is also a sensor would likely be a more cost effective way to create a wide-area sensing panel than a large array of sensing devices.

The China Factor

Finally, from a geographical perspective, where sales of smart coatings are made will depend on general economic trends and where specific end user markets are focused. For example, solar energy has a new lease of life in Japan following that country's nuclear disaster of a few years ago – so this might be a good place to sell a self-cleaning coating for solar panels. Much of the activity relating to smart coatings for military and naval use is to be found in the US. Consider the U.S. Navy's Office of Naval Research (ONR) development of anti-fouling solutions, for example.

That said, it is hard to avoid the conclusion that much of the future of smart coatings will be found in China. On the demand side the Chinese construction is patchy, but continues to be strong in places and – as we have already noted – smart coatings for the construction industry are already commercially important products. Similarly, the automotive industry is also a big consumer of smart coatings and the Chinese automotive industry is now the biggest in the world.

The Chinese smart coatings market may not be the easiest market to enter though, since tier one coatings firms are emerging in China itself and Chinese industrial policy makes it clear that Chinese firms will always be given preference in domestic markets.

But despite the strong potential of smart coatings in various industrial applications and geographies, NanoMarkets believes that some marketing questions remained unresolved. Perhaps at the top of the list is the premium pricing that most smart coatings enjoy. It will be hard to expand the market for smart coatings until this changes somewhat. We also think that environmental regulations may impact the growth prospects of some smart coating. For



example, smart coatings incorporating copper and chrome VI have faced a level of uncertainty in various applications.

