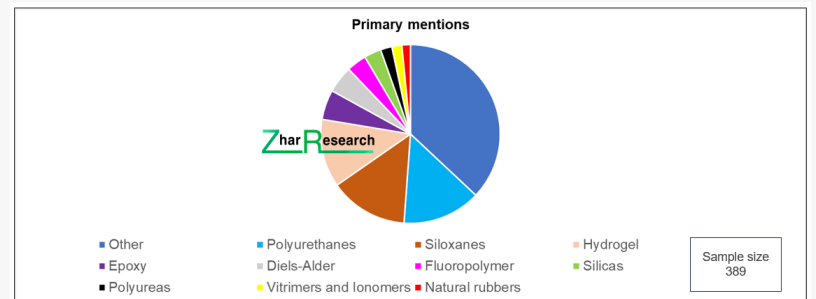


What Self-Healing Materials are leading the Billion-Dollar Sales Market

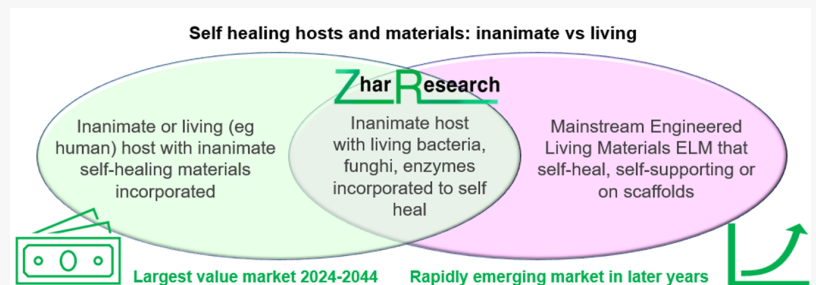
LONDON, COUNTY (OPTIONAL), UNITED KINGDOM, July 25, 2023 /EINPresswire.com/ -- Today, the best-selling self-healing materials include paint-protecting polyurethane car wrap and self-healing concrete using inorganic compounds or sleeping bacteria. New [Zhar Research](#) reports are heavily based on the cascade of research from 2023 and they predict a different future. So which materials can lead to billion-dollar sales? The new 400-page Zhar Research report, "[Self-Healing Engineering Materials, Markets, Technology 2024-2044](#)" covers about 70% of the market, engineering applications being very different from the rest.

Dr Peter Harrop, CEO of Zhar Research believes that, "Self-healing cementitious materials and asphalt are in there but mostly it analyses the self-healing polymers and polymer composites becoming very widely applicable. We find that particularly varies applications are opening up for polyurethanes, siloxanes – notably PDMS based formulations – and hydrogels, usually with various additives. However, in the frame are a wide variety of epoxies, Diels-Alder compounds, fluoropolymers notably those PVDF-based, vitrimers, ionomers and natural and artificial rubbers. Of course these terms partly overlap and the complexity of the mixtures, co-polymers and composites being employed is becoming considerable."

In this industry, which continues 21% compound growth on Zhar Research analysis, it is common to include activated rather than just autonomous self-healing and versions that do not restore



Self-healing compound families examined in the Zhar Research report, "[Self-Healing Engineering Materials, Markets, Technology 2024-2044](#)" out of 389 research projects, company activities and recommendations. www.zharresearch.com



Market bias of inanimate vs living self-healing materials 2024-2044. Source, Zhar Research report "[Self-Healing Engineering Materials, Markets, Technology 2024-2044](#)". www.zharresearch.com.

original strength such as self-healing car tires containing fluid and asphalt that need a heater run over it to perform its magic. This is excusable if you are seeking to prosper from benefitting society rather than just the pedants among us.

Winning applications

Zhar Research sees some certainties over the coming 20 year. About 70% of the market will be engineering applications but healthcare, representing most of the rest and covered by Zhar Research report, [“Self-Healing Healthcare Materials, Markets, Technology 2024-2044”](#), may enjoy higher margins. Within engineering, today the automotive sector is relatively large with all that paint-protecting car wrap and a few self-healing materials inside but Zhar Research warns of trouble ahead. Part of it is private cars being banned from cities and robotic vehicles being intensively used and therefore needed in smaller numbers. In contrast, the energy and building/construction sectors will be huge self-healing markets particularly if the initial work on such things as self-healing solar panels is successful and certain large gaps in the market identified by Zhar Research are addressed.

Intrinsic or using inserted artefacts

The largest sales by far will be for intrinsic self-healing materials where the material itself is designed to adequately self-heal not where a separate artefact is added to the material conferring self-healing notably microcapsules or a vascular system (like human heart with blood vessels, though pumps are not used and reservoirs are unusual). Extrinsic healing systems – embedded components reacting to a damage stimulus - have limited usefulness since the components such as microcapsules cannot be large or too numerous or they can weaken the host structure. Some cannot work twice in one damage location. Nonetheless, microcapsules have proved viable even in some coatings, so their market potential is still considerable beyond just bulk materials. Vascular systems can work repeatedly and often they can repair more severe damage but their expense and mechanical effect on the host limit their applicability. However, something of an intermediate situation is possible between intrinsic and extrinsic with such things as steel wire added to enable induction heating and fibers that hold together a weak SH material or permit deep light curing to damage sites.

Regions

Regionally, The Americas, Europe Middle East Africa EMEA and East Asia all have huge potential. However, the detail may be different with the usual bias of the USA towards military and East Asia towards consumer goods and Europe, the USA and China leading innovation in these technologies.

Inanimate or animate

Dr Harrop tells us, “Organic self-healing technology will be most broadly employed but inorganic

chemistry in self-healing cementitious material will be huge. As for animate vs inanimate the Engineered Living Materials ELM being researched will mainly appear on inanimate scaffolds and we have determined which materials win for those. Overall, mass commercialisation of ELM is over ten years ago on current evidence and issues of standards and regulation are particularly acute in these cases."

Problems that are opportunities

Zhar Research considers regulation and standards to be particularly challenging. It examines a large number of soft materials and their applications because they self-heal microcracks and distortion but there is a dilemma because, being soft, they easily separate completely so they are far from self-healing for catastrophic damage. Indeed, they are particularly vulnerable to it. Soft materials are needed for wearables, soft robotics and more. However, biomimetics – usefully copying nature - may come to the rescue. In addition, issues include poor self-adhesion of silicones, weakness of hydrogels and supramolecular bonding and cost and disposal of fluoropolymers. Fortunately, help is on the way in most cases. For example, strengthening of self-healing hydrogels is practised using additives and there are even forms that have massive compressive strength only when under load. Some fluoropolymers can now be recycled and self-healing using relatively affordable PVDF is in the ascendant. It is possible that the European Union may ban fluoropolymers because they are sometimes made using environmentally hazardous precursors. However, Harrop sees this as, "Throwing the baby out with the bathwater."

Dr Peter Harrop
Zhar Research
7850258317 ext.
peterharrop@zharresearch.com
Visit us on social media:
[LinkedIn](#)

This press release can be viewed online at: <https://www.einpresswire.com/article/646169625>

EIN Presswire's priority is source transparency. We do not allow opaque clients, and our editors try to be careful about weeding out false and misleading content. As a user, if you see something we have missed, please do bring it to our attention. Your help is welcome. EIN Presswire, Everyone's Internet News Presswire™, tries to define some of the boundaries that are reasonable in today's world. Please see our Editorial Guidelines for more information.

© 1995-2023 Newsmatics Inc. All Right Reserved.