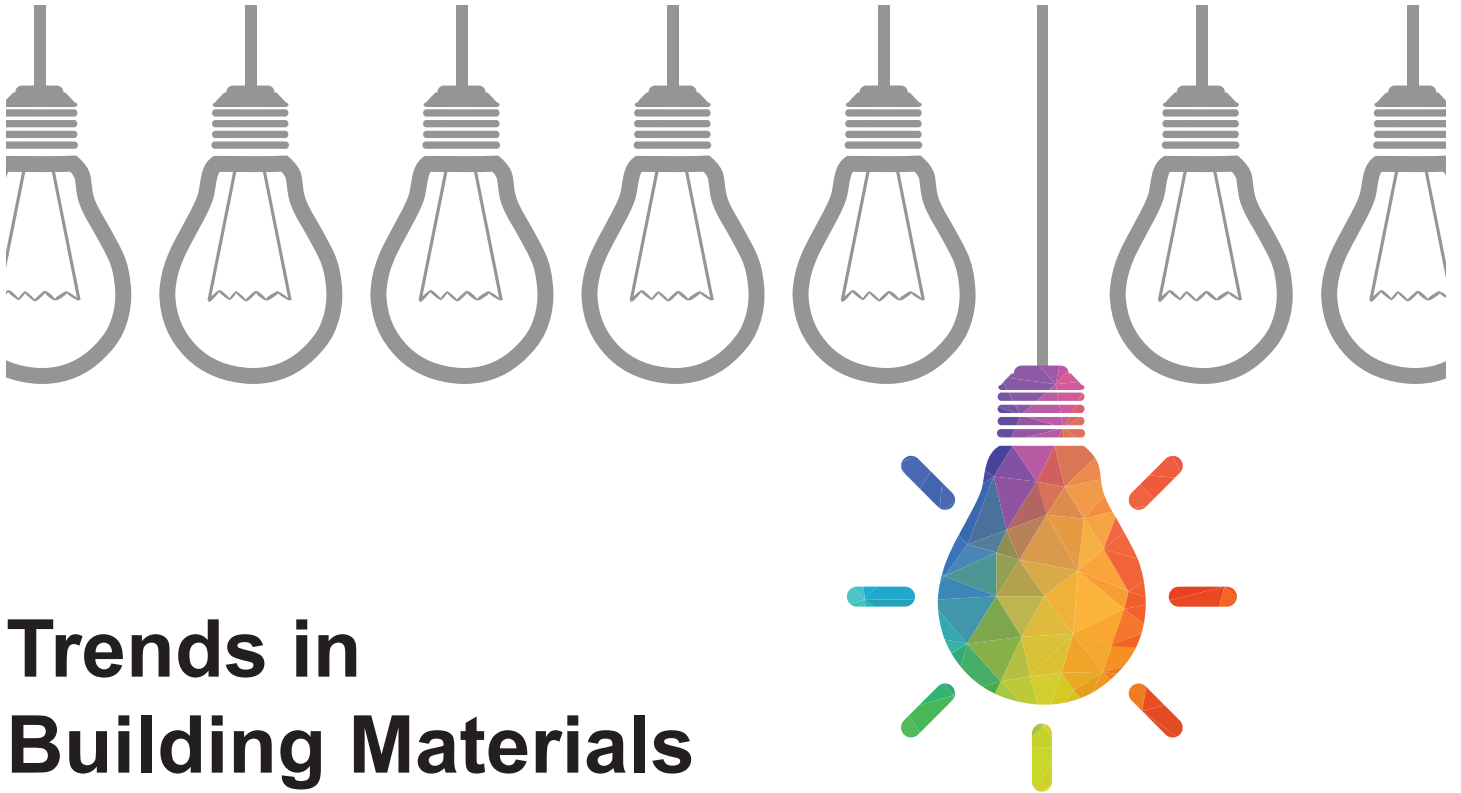




Trends in Building Materials

The rapid innovation in protective and decorative materials is reflected in the rise in the number of U.S. patent applications filed in this space over the last five years. In fact, the number of patent applications for these materials dwarfs all other types of building materials in our study.

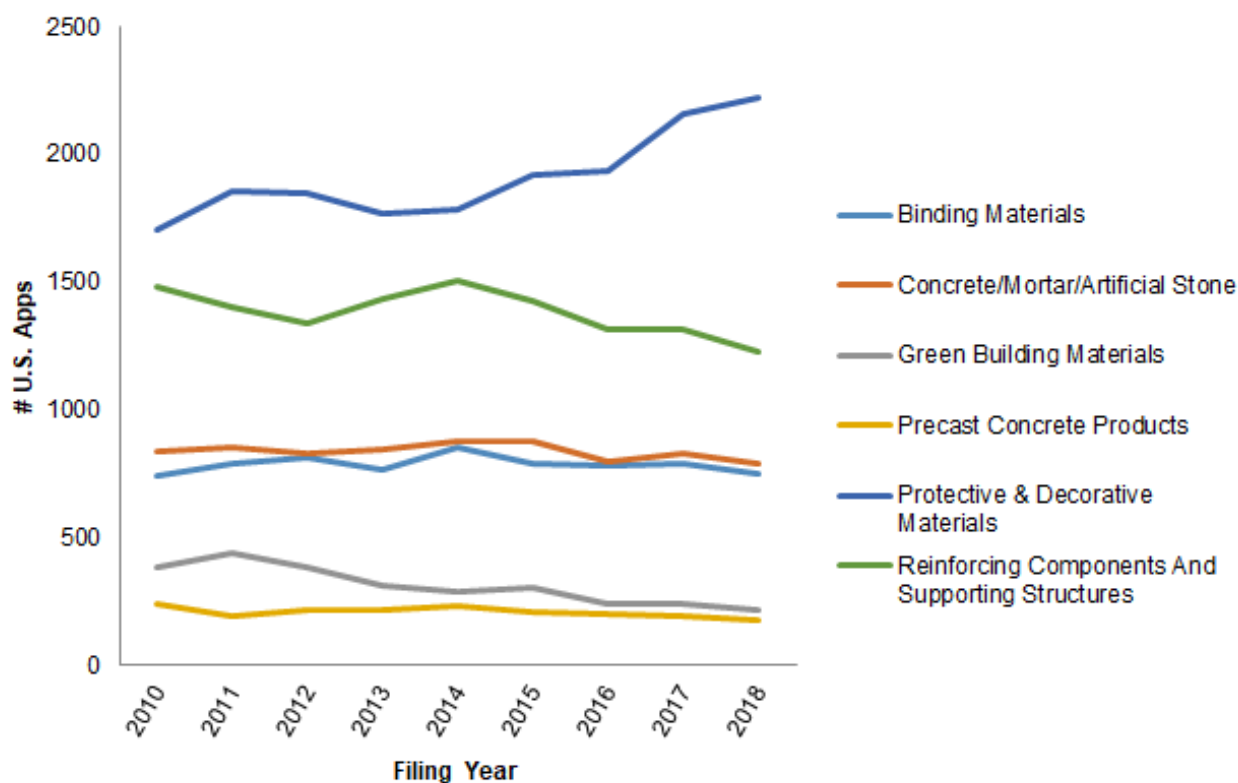
These are exciting times for innovation in building materials, from transparent aluminum ceramics³⁸ to self-healing concrete³⁹ to floors made of mushrooms.⁴⁰ The rapid pace of innovation in this field is reflected in the steady flow of patent applications filed in the USPTO and the number of patents issued to industry businesses.

To delve deeper into the trends of patenting innovation in building materials, we have defined the following technology clusters within the general building materials industry:

Taxonomies and expanded definitions of these clusters are included in appendix A.

Building Materials -Level I Clusters	Level II Clusters
Binding Materials	Cement
	Polymeric Materials
	Pozzolan Materials
Concrete/Mortar/Artificial Stone	-
Green Building Materials	-
Precast Concrete Products	-
Protective & Decorative Materials	-
Reinforcing Components And Supporting Structures	-
Smart Building Materials	-

Patenting of protective and decorative materials is on an upswing while it is slumping in green building materials



³⁸ <https://hackaday.com/2018/04/03/whats-the-deal-with-transparent-aluminum/>

³⁹ <https://www.cnn.com/2015/05/14/tech/bioconcrete-delft-jonkers/index.html>

⁴⁰ <https://www.smithsonianmag.com/innovation/fungus-material-future-180962791/>

Innovative protective and decorative materials promise significant benefits in both new construction and the remediation of older buildings. These materials, which include paints, vapor barriers and polishes, improve the service and decorative quality of buildings and structures, as well as protect structural members from atmospheric and other dangers such as water, heat, fire, and even microbes.

One of the biggest promises newer protective and decorative materials hold is energy savings. Because the heating and cooling of buildings account for 35 to 60 percent of total energy demand and produce nearly 40 percent of emissions in urban areas, reducing the energy consumption associated with these activities offers a fast and significant payoff in terms of urban sustainability and lower greenhouse gas emissions.⁴¹ Energy-efficient materials can be used not only in new construction, but also with envelopes for existing buildings.

The rapid innovation in protective and decorative materials is reflected in the rise in the number of U.S. patent applications filed in this space over the last five years. In fact, the number of patent applications for these materials dwarfs all other types of building materials in our study.

On the other hand, since 2011, there has been a pronounced decline in patent filings on innovations in green building materials. Even though several industry reports describe rising public awareness and strong interest in green technologies and materials, that has not translated into significant increases in patenting in this technology cluster. One possible explanation for this paradox is that the industry is prioritizing capitalization on its existing innovative technologies rather than moving ahead with resource-intensive new R&D. Another possibility is that the industry is relying on other forms of intellectual property protection (*e.g.*, trade secrets), opting to patent only its most promising and groundbreaking innovations.

The drop-off in green building materials innovation also corresponds to the end of government incentives that were promulgated to help the U.S. economy recover from the Great Recession, suggesting that this industry is sensitive to the cost of innovation.⁴² This sensitivity may be caused in part by the uncertainty surrounding the commercial adoption of new green building materials. The adoption of new green building materials is uncertain for at least the following three reasons. First, the construction of LEED-certified buildings has declined since 2013, likely because of how long and expensive the certification process is.⁴³ Second, many green building materials have not demonstrated the performance and durability required in construction materials, creating doubt as to their suitability in construction, especially if the construction must withstand extreme heat, cold or humidity. Third, the credit-crunch and housing-market collapse in 2008 also made green building products less sellable because they are more expensive than traditional products. The consequence of diminished demand for green building products during the credit crunch is reduced budgets for R&D, which in turn, may be resulting in fewer patent filings as we see in this study.

⁴¹ <https://www.eesi.org/files/climate.pdf>

⁴² <https://journalistsresource.org/studies/environment/cities/governmental-incentives-green-building-construction/>

⁴³ <https://www.questia.com/newspaper/1P2-38986962/leed-dwindles-number-of-new-certified-sustainable>; <http://www.sandbergphoenix.com/construction-litigation/blog/leed-certification-on-the-decline-while-energy-efficiency-is-on-the-rise>

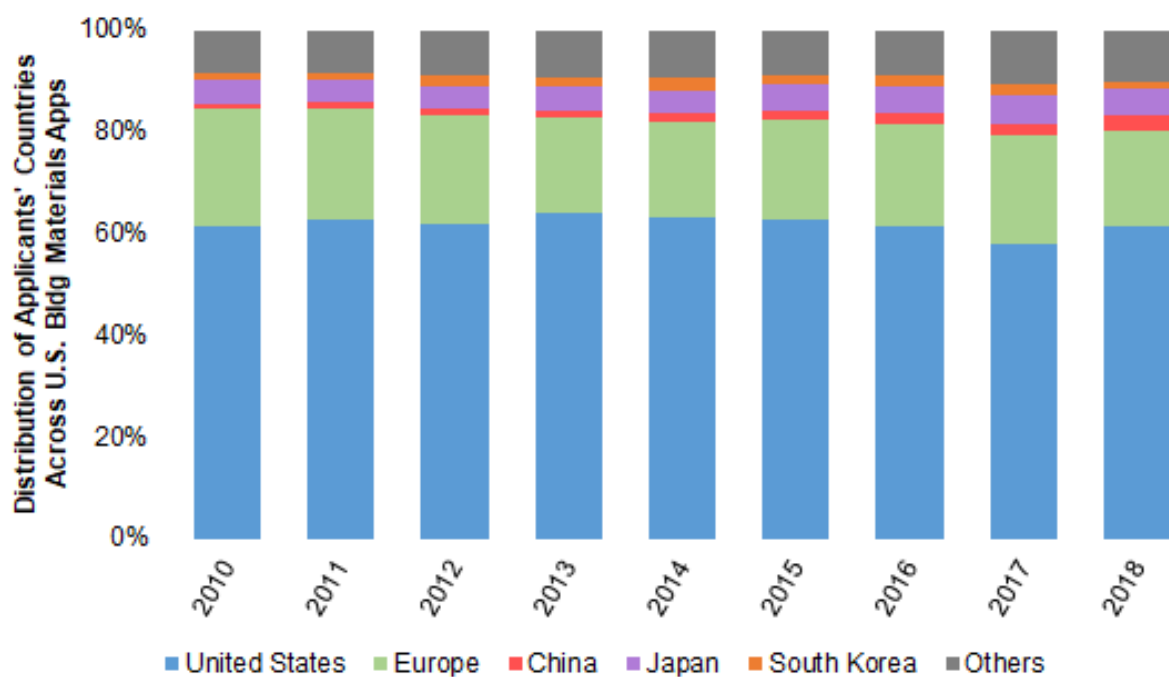
Incumbents dominate the building material industry, in terms of both owning the majority of patents and filing the majority of new patent applications.

USING 2016 DATA:	
	Most Families Filed by
	(Applicants in alphabetical order)
Building Materials	Baker Hughes, Boeing, Caterpillar, Schlumberger -Technology Corp., United States Gypsum Co.
Level I	
Binding Materials	Baker Huges, Nano And Advanced Materials Institute, Schlumberger Technology Corp. Soldia Technology, United States Gypsum Co.
Concrete/Mortar/Artificial Stone	Black & Decker, Columba Machine, Herostone Quartz Surfaces, Quipip, Nano And Advanced Materials Institute
Green Building Materials	Baker Huges, Council OF Scientific & industrial Research, Recover Energy Services, Sk Energy Co., Sk Innovation, Co., University of Florida
Precast Concrete Products	Corning, Covestro, Corruven Canada, Halliburton, Midwest Concrete & Masonry Supply, Inc.
Protective & Decorative Materials	Boeing, Covestro, General Electric, Owens Corning, United States Gypsum Company, Usg Interiors
Reinforcing Components And Supporting Structures	Boeing, Campvalley (Xiamen) Co., Caterpillar, Columbia Insurance Co., Hunter Douglas
Smart Building Materials	Baker Huges, General Electric, Heliotrope Technologies, Saudi Arabian Oil Co., Schlumberger Technology Corporation

Companies at the forefront of innovation with respect to materials and building R&D are also the leading patent filers in our study. New building materials is an important category of innovation that has the potential to transform the building industry in a matter of years rather than decades. It is also a competitive industry, where R&D is expensive.⁴⁴ It is not surprising, therefore, that leaders in this industry are seeking to protect their investment in innovation and their competitive positions with patents.

⁴⁴ <https://www.inc.com/greg-satell/materials-science-may-be-most-important-technology-of-next-decade-heres-why.html>

The percentage of U.S.-based patent applications is holding steady near 60%



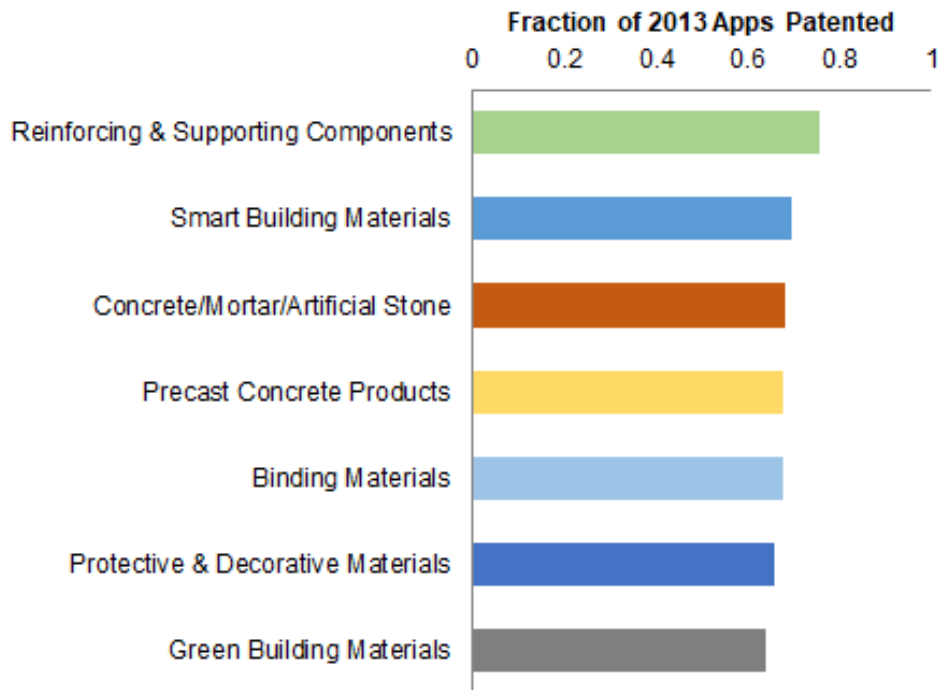
While patent applications originating in the United States and Europe continue to dominate in the building materials industry, China’s entry into this industry is noteworthy. Although the overall number of Chinese applications remains small, our data show a significant year-over-year increase in these applications. This trend is consistent with China’s relatively recent focus on green buildings, pollution reduction and urban sustainability,⁴⁵ and its policy decision to encourage patent protection for its companies’ innovations, both domestically and internationally, with generous tax benefits.⁴⁶



⁴⁵ <https://www.weforum.org/agenda/2017/06/china-clean-green-buildings-future/>
⁴⁶ <https://chinapower.csis.org/patents/>; <https://www.managingip.com/Article/3538144/How-patent-subsidies-boost-R-D.html?ArticleId=3538144>

Patents are granted on the majority of building materials patent applications

Of patent applications filed in 2013, over 60% have been allowed to issue as a patent (and more may be forthcoming). Applications relating to reinforcing and supporting components are allowed more than 75% of the time making those patents easier and thus cheaper to obtain.

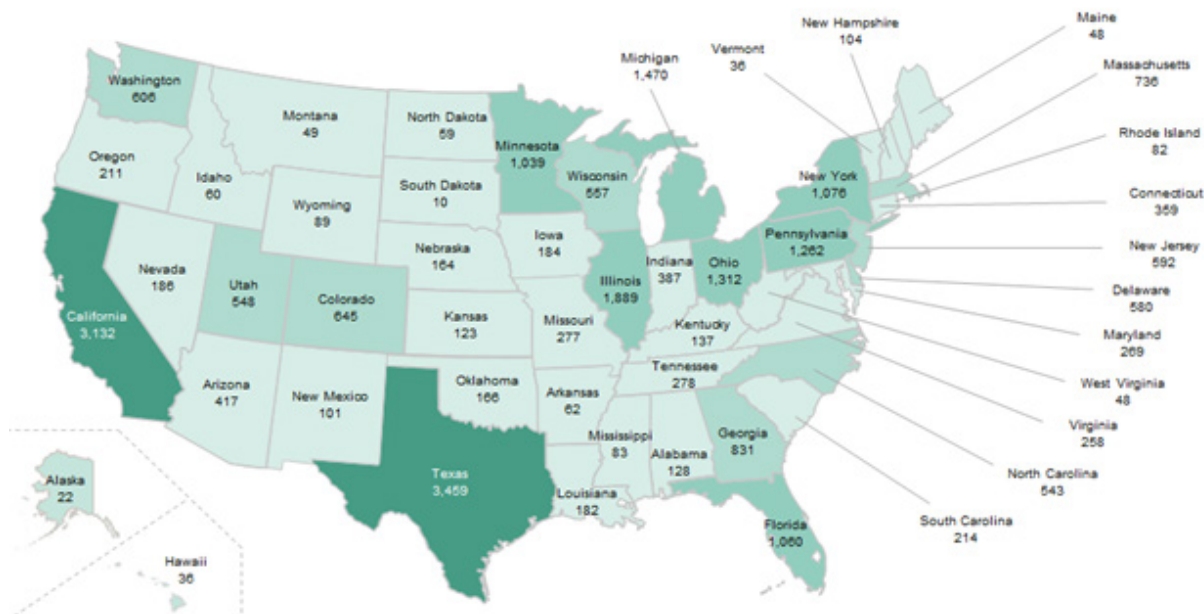


Applications for building materials are predominantly examined in Technical Centers 3600 (examining applications in the Transportation, Electronic Commerce, Construction, and Agriculture fields) and 1700 (examining applications in the Chemical and Materials Engineering fields), in both of which, allowance rates tend to be consistent with the overall average allowance rate of the USPTO if you exclude the business method Art Units.

Texas is the dominant patent hub for Building Materials

California dominated each of the industries surveyed in this study except Building Materials. The population advantage explains California's dominance in innovation, but Texas has a notable hub for this technology due to the strength of its hydrocarbon and aerospace industries. Hydrocarbon production relies on cutting edge building materials such as underwater concrete along with the exotic materials needed to support NASA and other aerospace efforts.

Distribution of filings across states for the Building Materials





About KT

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