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CAS SCIFINDER® CARBON-BASED ELECTRODE MATERIALS USE CASE

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Optimizing the use of carbonaceous petroleum byproducts in rechargeable lithium batteries

As the world seeks to re-engineer its energy sources, storage systems have experienced a surge in research and development for, among others, application in electric vehicles and as an adjunct to renewable power generation.

Carbon-based electrode materials have been widely explored in electrochemical energy storage in rechargeable lithium ion batteries–the technology of choice for electric vehicles[1]–due to their capacity, energy density, and power density.[2]

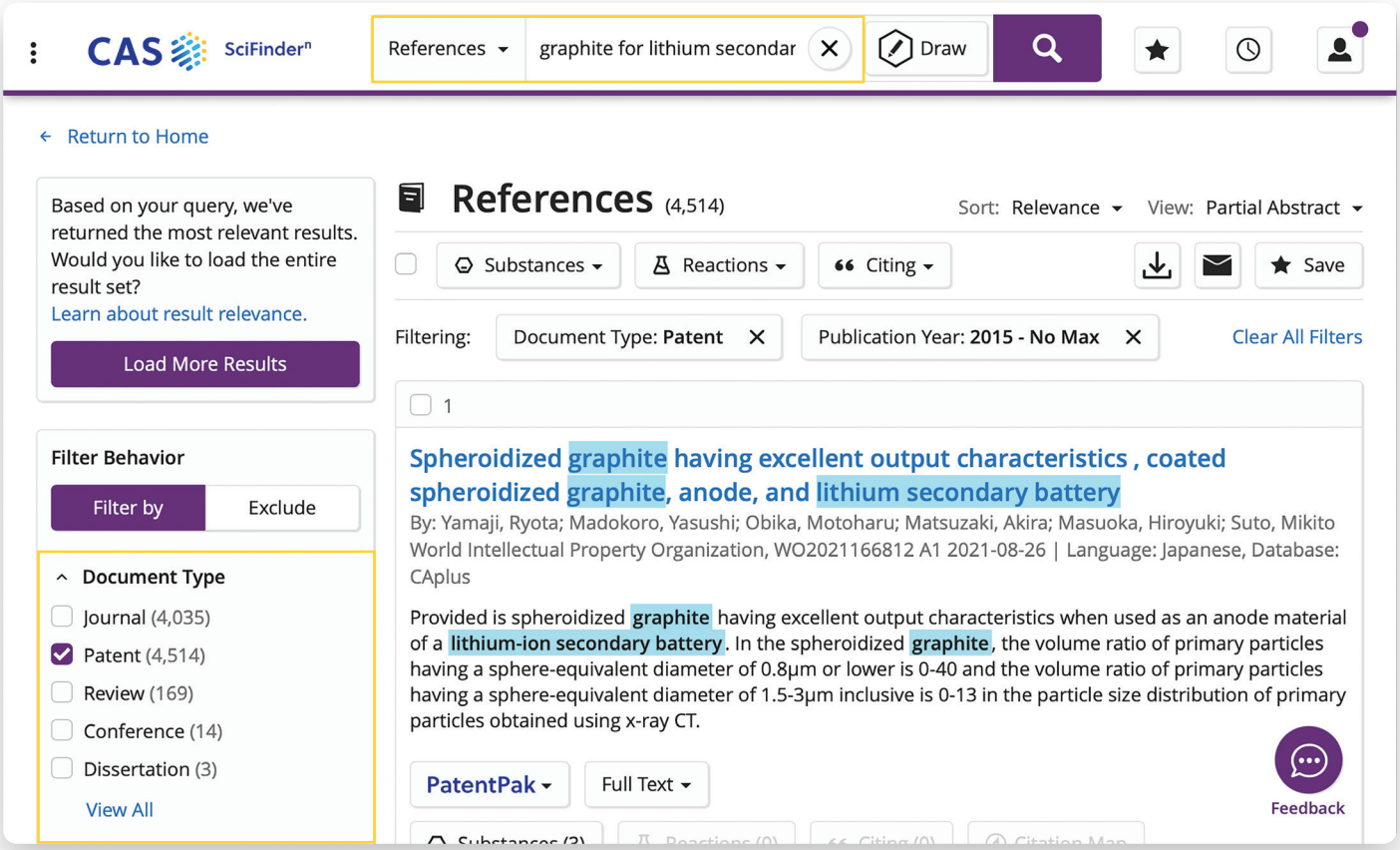
Carbonaceous materials such as graphite and petroleum coke are widely used in the anodes of lithium-based secondary cells.[3] The graphitization process of coke and pitch for electrode materials is well-published,[4] but there are challenges in developing carbon-based electrode materials with optimum cycle characteristics and structural performance.

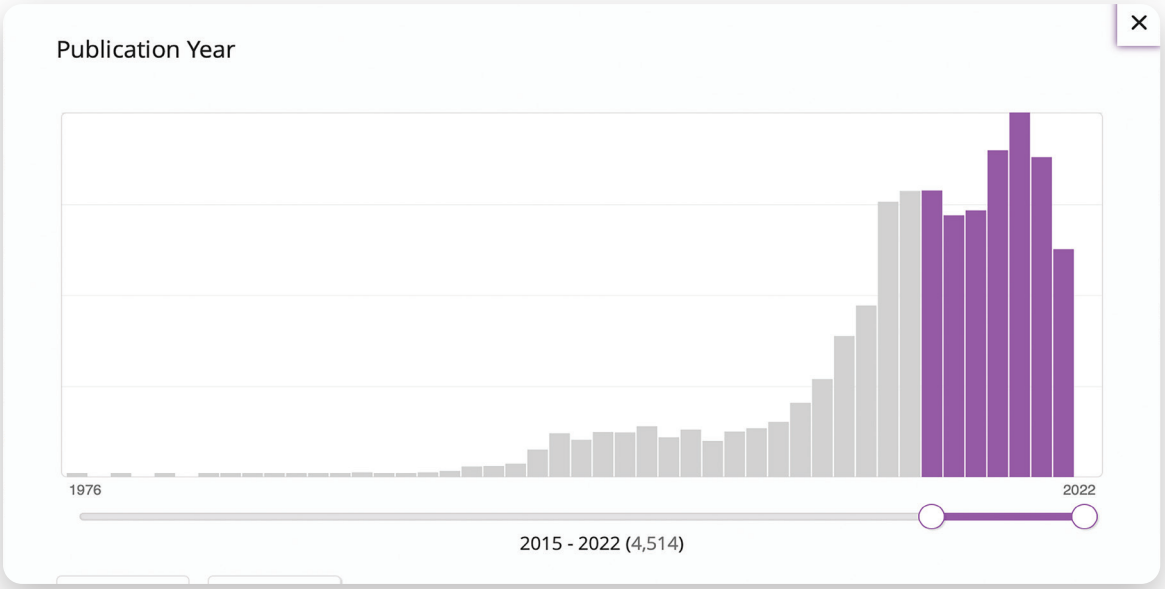
Low tap density, low Coulombic efficiency, and prolonged charge-transfer distance across the electrode can reduce performance based on practical packing densities and thicknesses, limiting the ability to achieve high energy and power densities.[5,6] However, assembly strategies have been developed that realize synergies between primary carbon nanostructures and advanced carbon architectures in high-performance electrodes.[5]

How can CAS SciFinder support your research in carbon-based electrode materials?

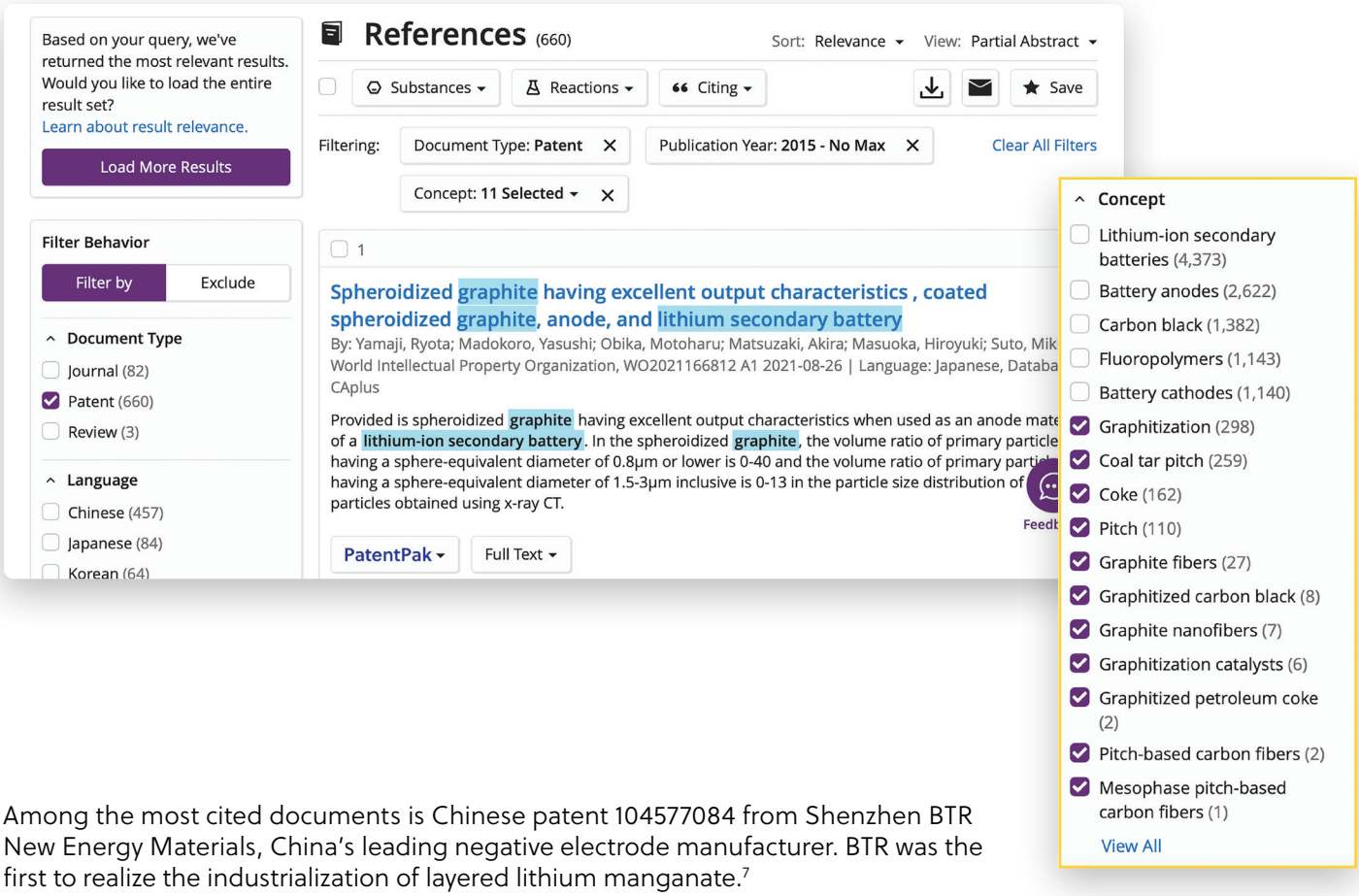
This example shows how you can gain new insight in this field and stay up-to-date on competitors with CAS SciFinder.

A reference search in CAS SciFinder on the topic "graphite for lithium secondary batteries" returns more than 15,000 research publications, more than half of which were published since 2015. This includes 4,514 patent documents since 2015.

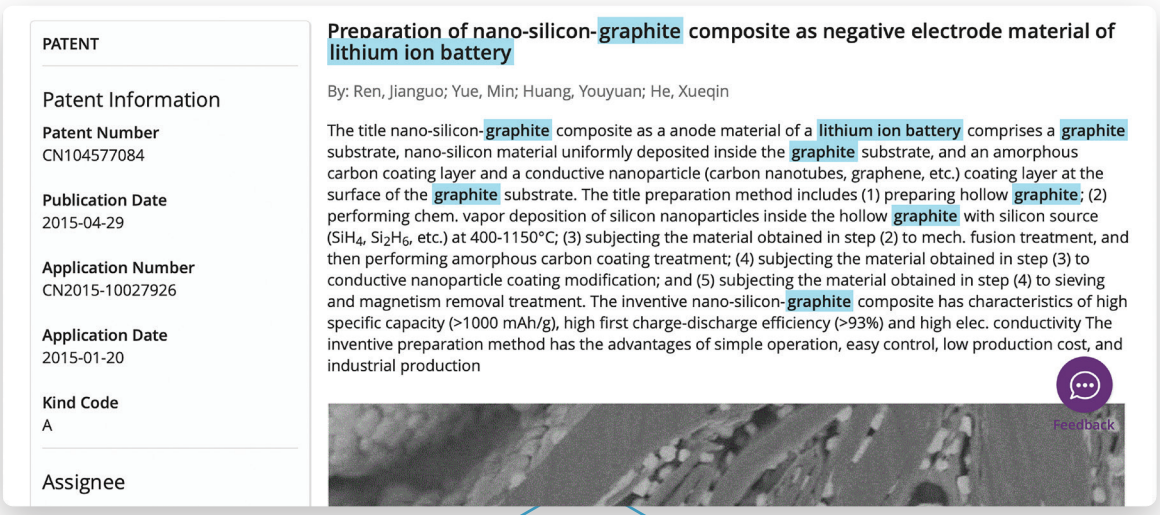


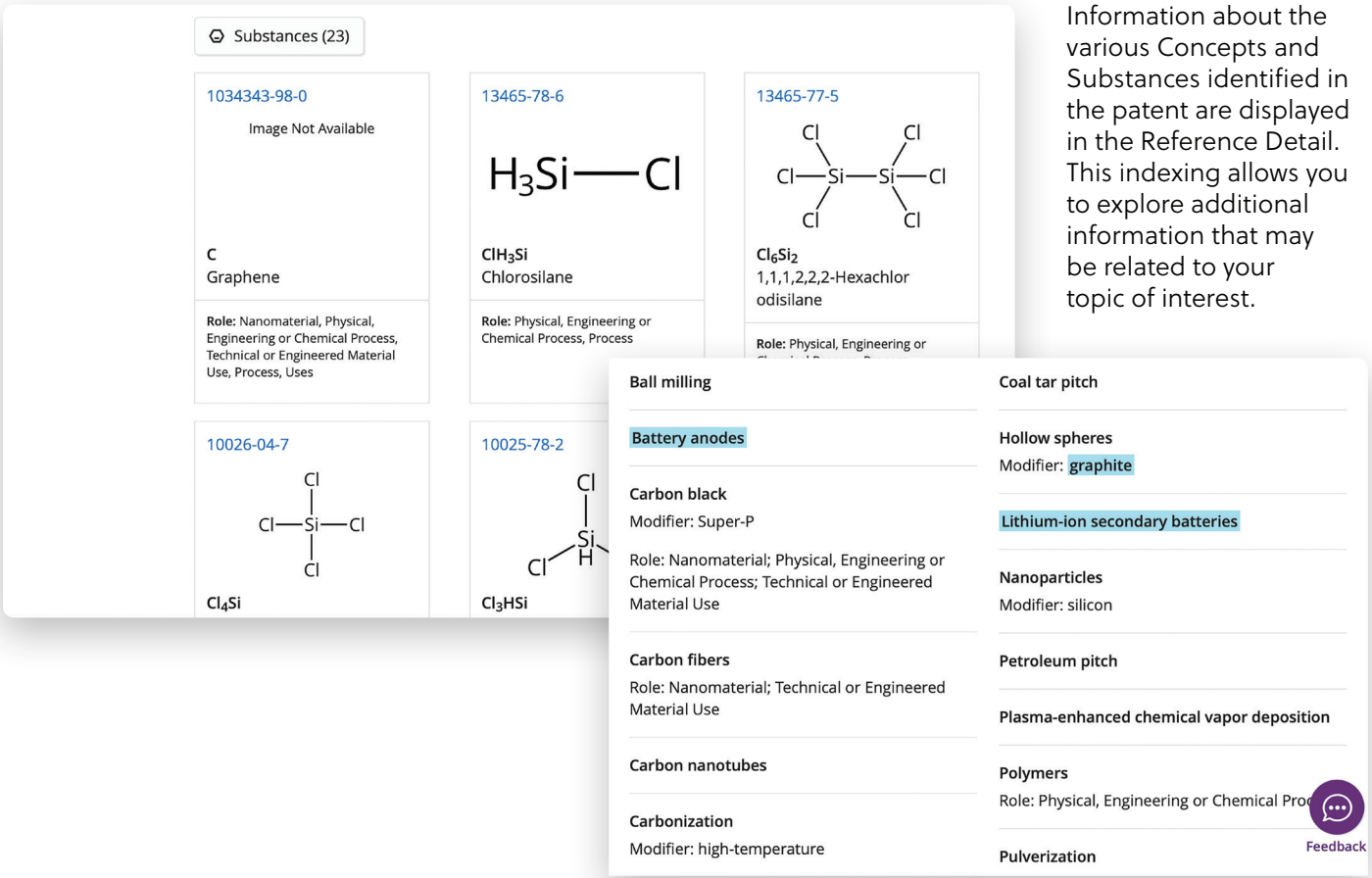


With the advanced functionality of CAS SciFinder, you can easily refine your results using the Concepts filter. These standardized scientific terms provide crucial insight into the core research in the result set.



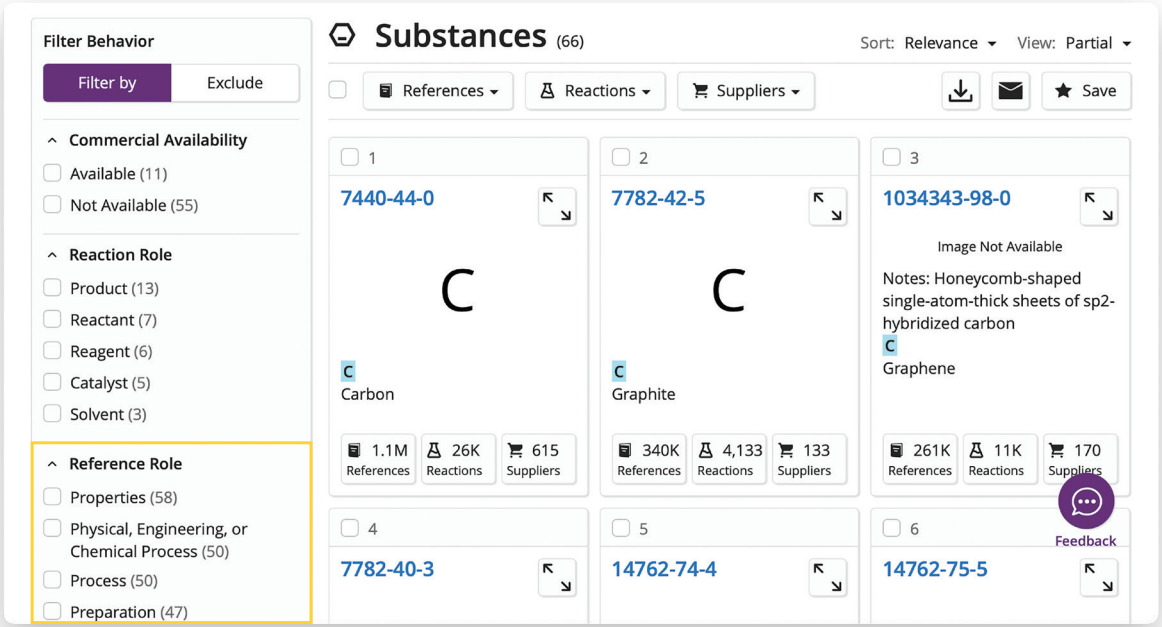
Among the most cited documents is Chinese patent 104577084 from Shenzhen BTR New Energy Materials, China's leading negative electrode manufacturer. BTR was the first to realize the industrialization of layered lithium manganate.[7]





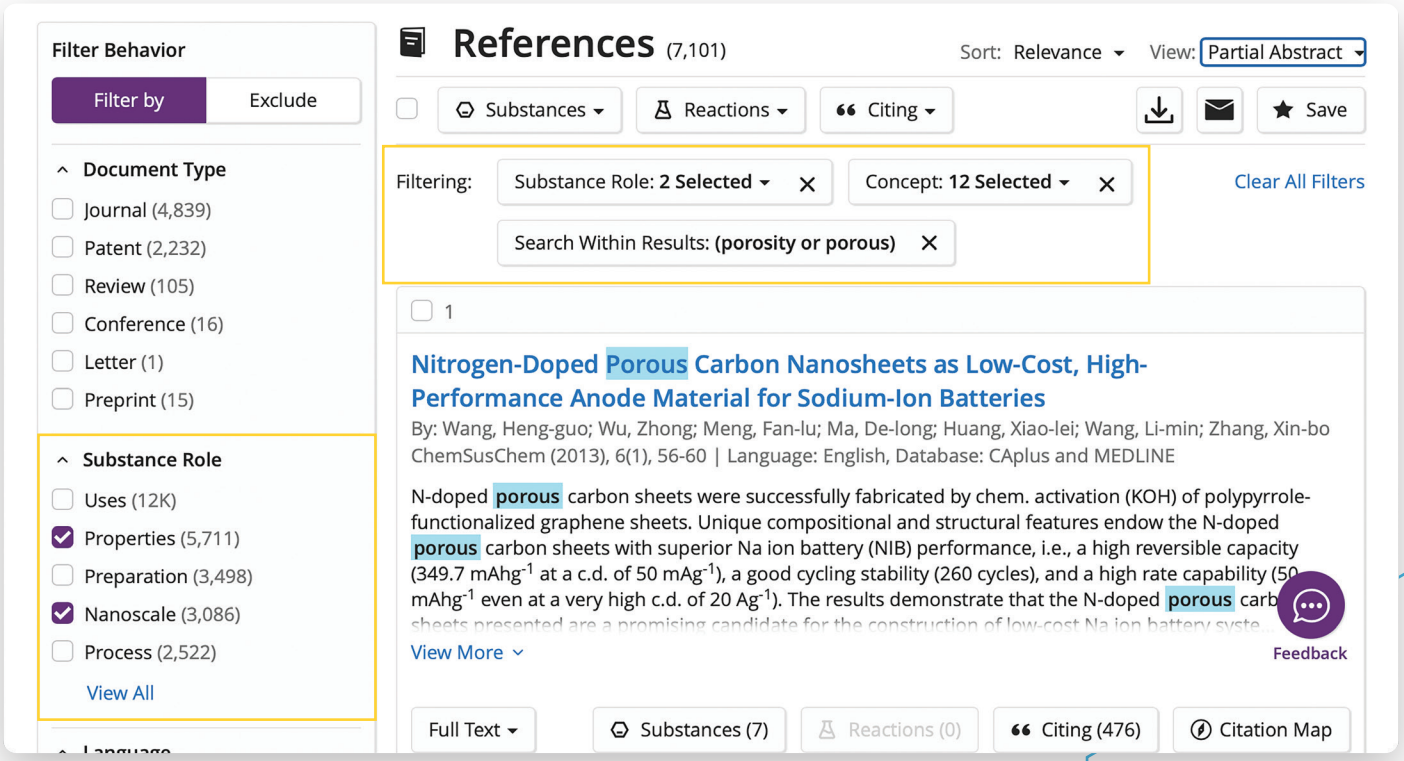
Information about the various Concepts and Substances identified in the patent are displayed in the Reference Detail. This indexing allows you to explore additional information that may be related to your topic of interest.

Starting with a substance search in CAS REGISTRY®, the CAS substance collection, you can begin to focus specifically on the properties of carbon nanomaterials used in electrodes.

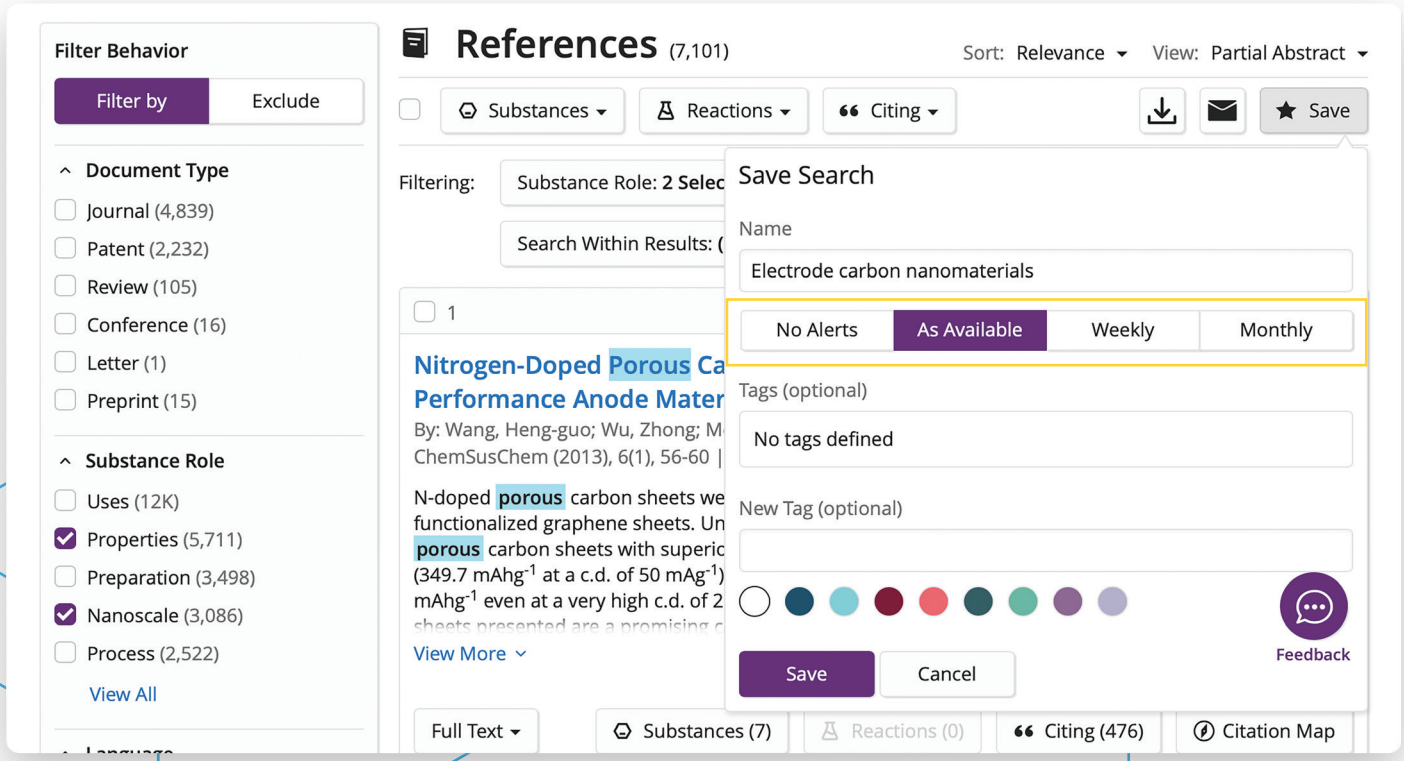


References retrieved from the substance records can be narrowed by Substance Roles, powerful CAS indexing terms used to find precise information about substances in a publication. CAS SciFinder enables you to focus the search on carbon nanomaterials from petroleum byproducts applied to electrode materials.

Carbon nanomaterials-based supercapacitors are expected to have a hierarchical porous structure with balanced distribution of macropores, mesopores, and micropores.[8] CAS SciFinder includes concepts related to nanometer properties, such as porosity.



Now that you have a result set of interest, the Alerts feature in CAS SciFinder can help you keep up-to-date on the latest research and competitor developments.



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1. Xie, J., Lu, YC. A retrospective on lithium-ion batteries. *Nat. Commun.* **2020**, *11*, 2499. **2.** Togonon, J., *et al.* Pure carbon-based electrodes for metal-ion batteries. *Carbon Trends* **2021**, *3*, 10035. **3.** Loeffler, N., *et al.* Secondary lithium-ion battery anodes: from first commercial batteries to recent research activities. *Johnson Matthey Technol. Rev.* **2015**, *59* (1), 34-44. **4.** Mazumder, B. Chapter Seven – Coal-derived industrial carbons. In *Coal Science and Engineering*; Woodhead Publishing India, **2012**; pp 344-451. **5.** Wang, L., *et al.* Enhanced roles of carbon architectures in high-performance lithium-ion batteries. *Nano-Micro. Lett.* **2019**, *11*, 5. **6.** Zhang, C., *et al.* Towards superior volumetric performance: design and preparation of novel carbon materials for energy storage. *Energy Environ. Sci.* **2015**, *8*(5), 1390–1403. **7.** Guangming Government Online. Shenzhen BTW new energy and materials company limited. http://www.szgm.gov.cn/english/business/enterprises/content/post_4571938.html (accessed 2021-10-21). **8.** Bai X., *et al.* Hierarchical porous carbon with interconnected ordered pores from biowaste for high-performance supercapacitor electrodes. *Nanoscale Res. Lett.* **2020**, *15*, 88.

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