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Bobby Neuhold & Stephanie Hofmann

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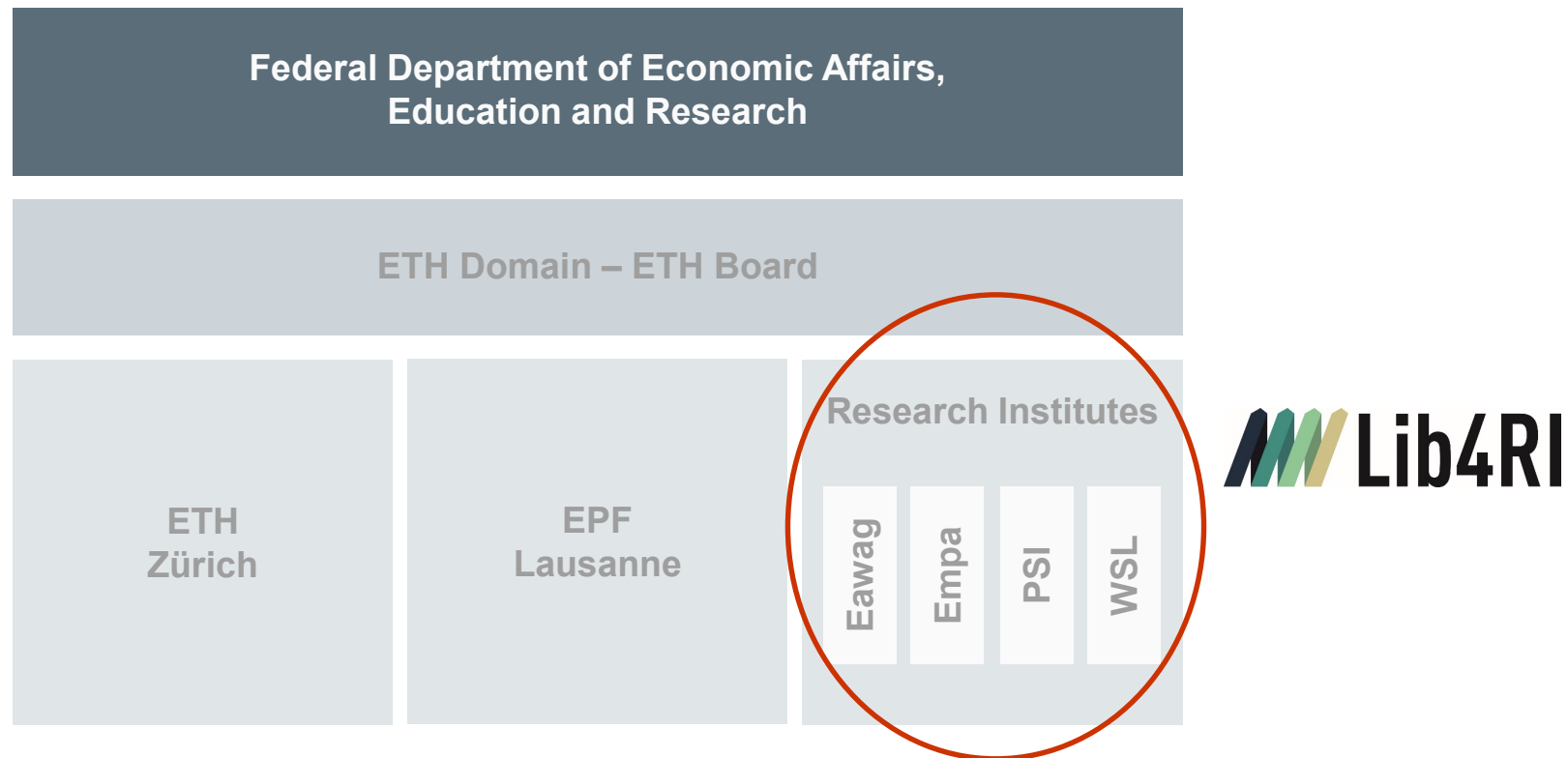
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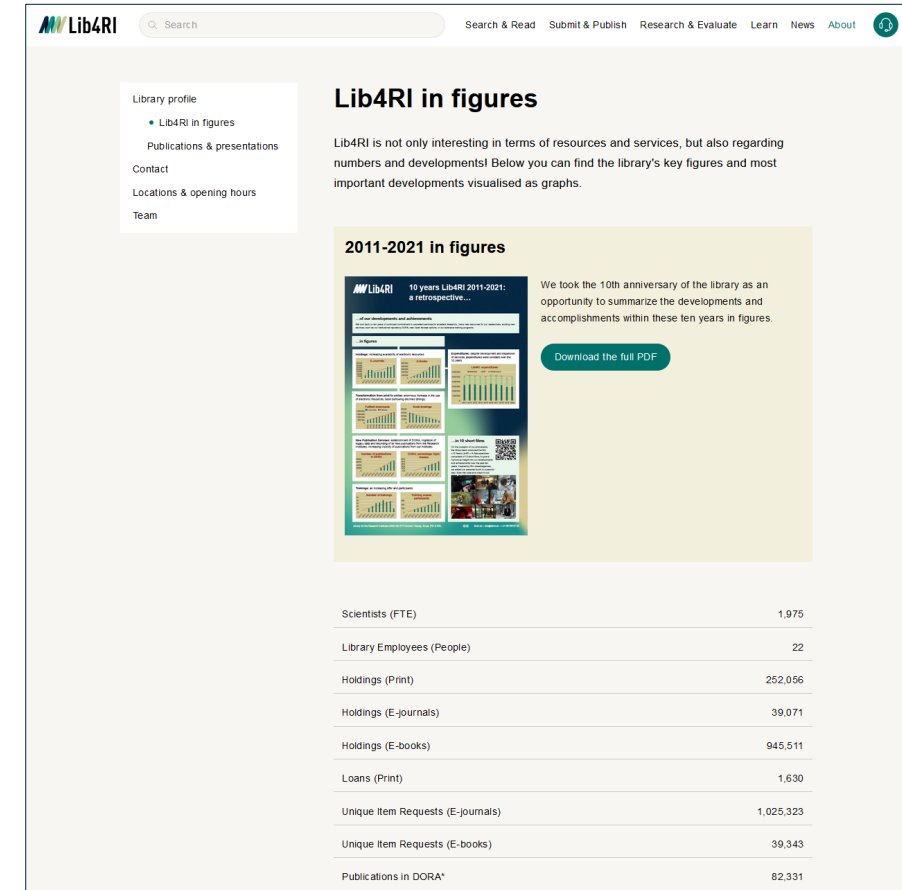
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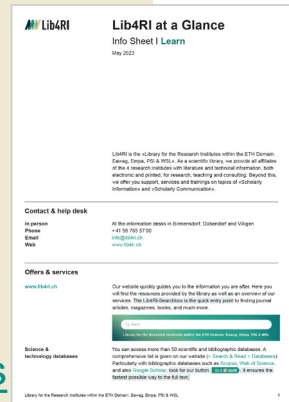


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
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
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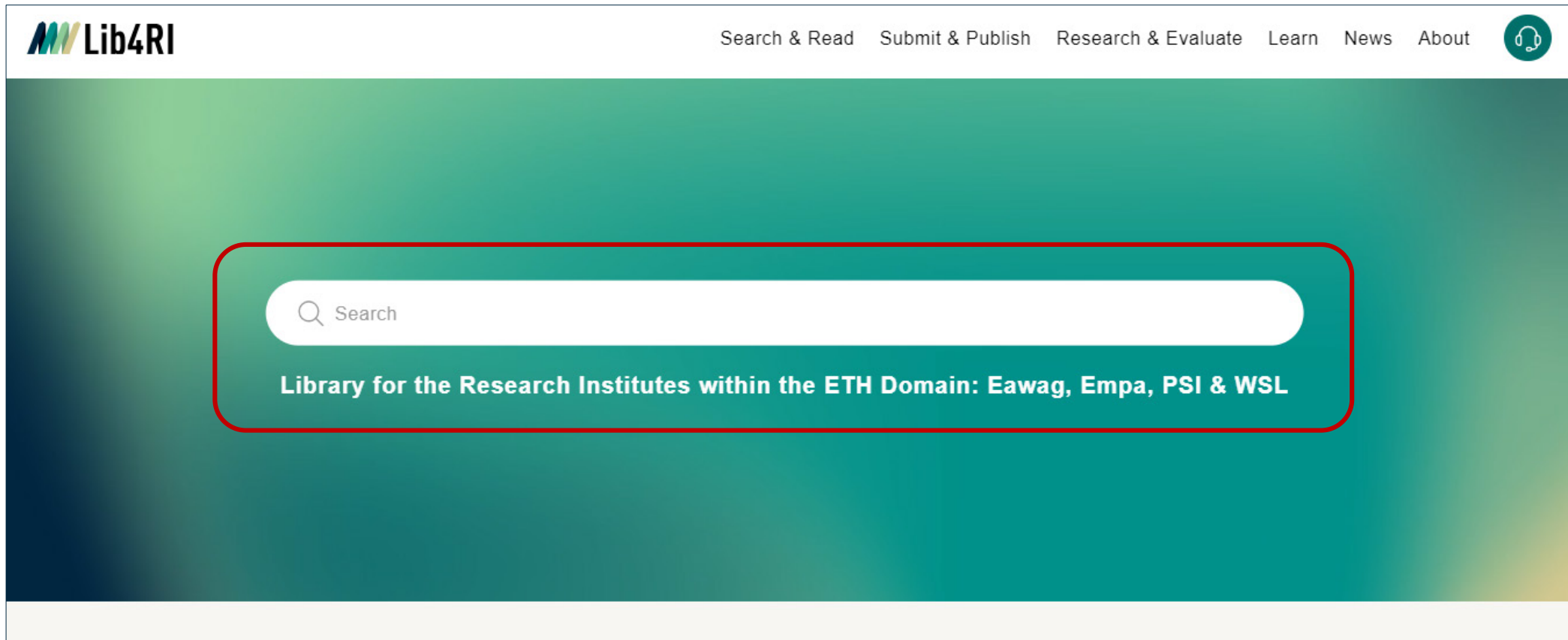
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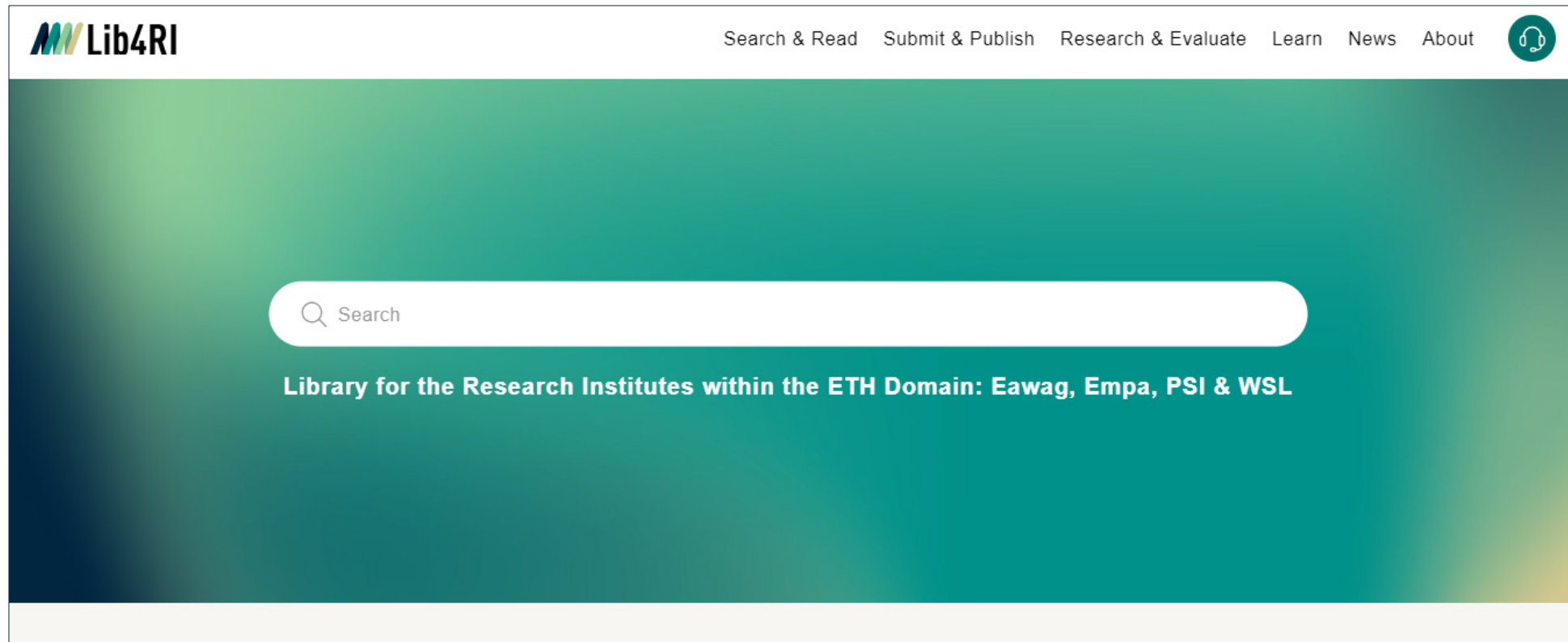
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STEEL RESEARCH

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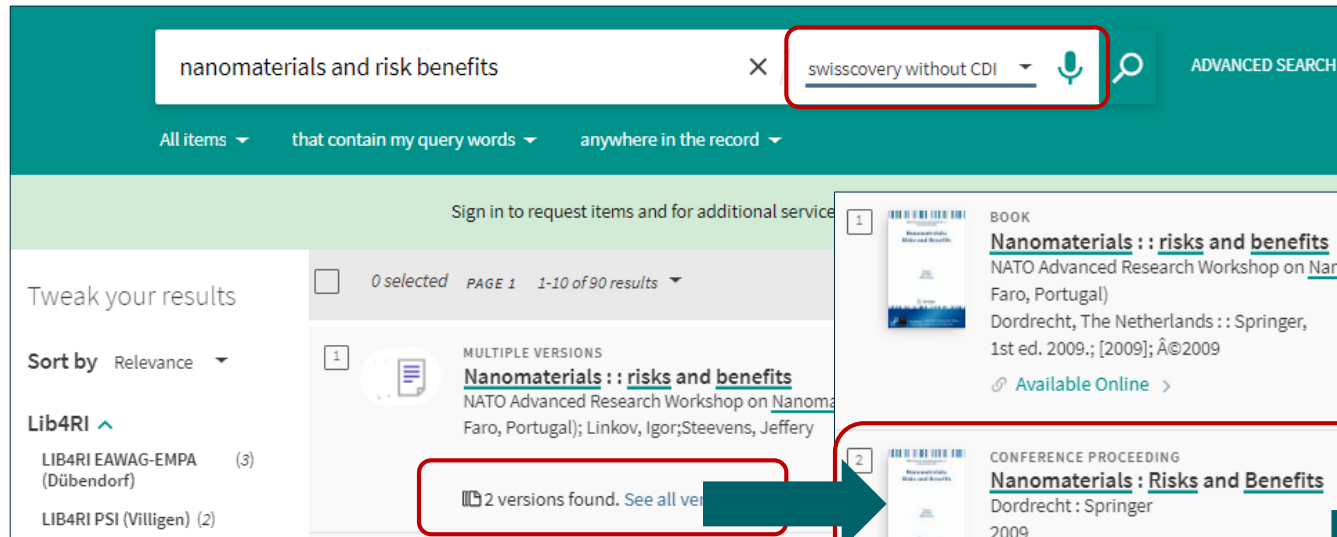
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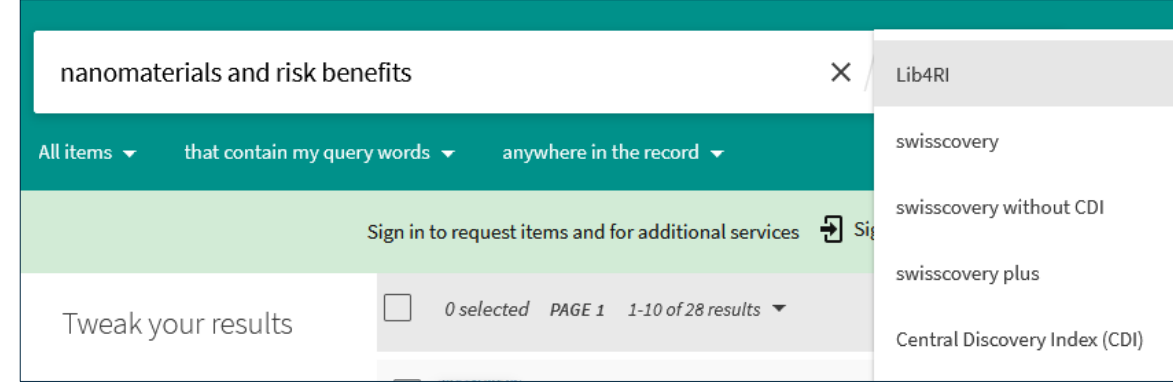
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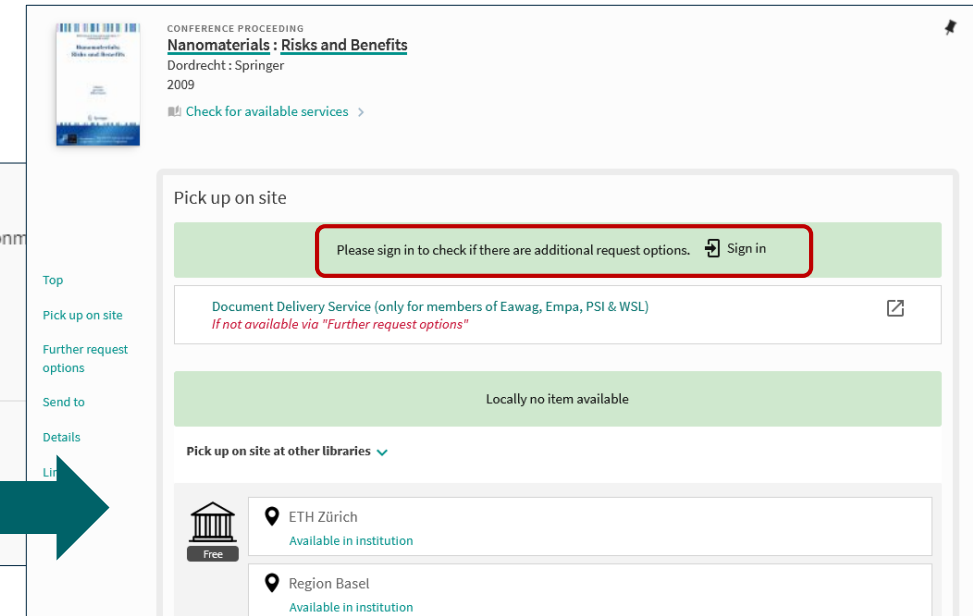
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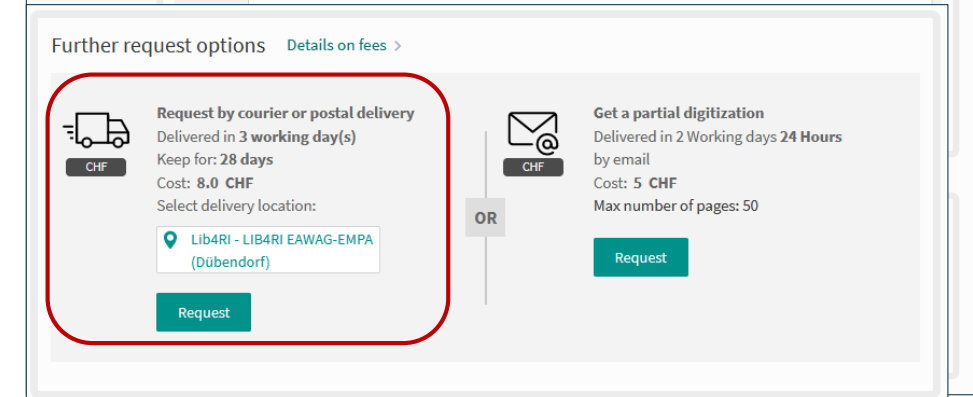
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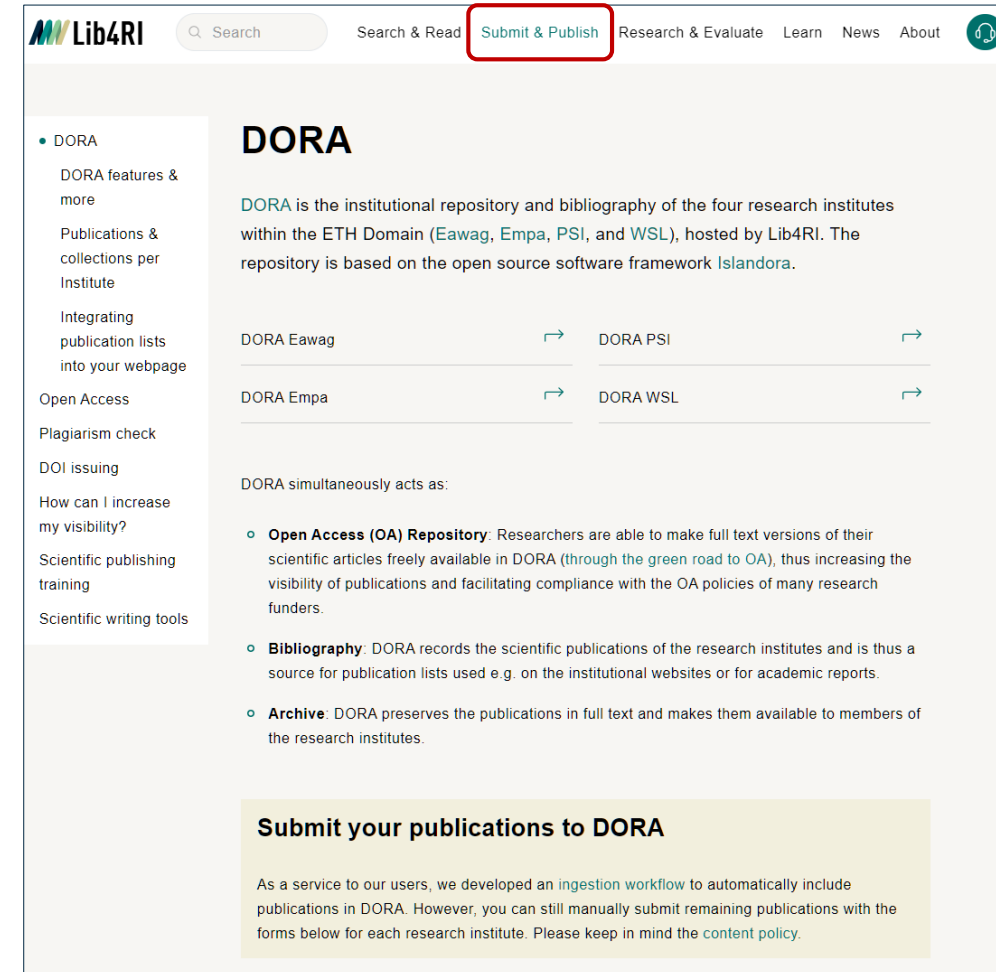
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Ugly ducklings - the dark side of plastic materials in contact with potable water

Neu L, Bänziger C, Proctor CR, Zhang Y, Liu W-T & Hammes F

Citation

APA

Neu, L., Bänziger, C., Proctor, C. R., Zhang, Y., Liu, W. T., & Hammes, F. (2018). Ugly ducklings - the dark side of plastic materials in contact with potable water. *npj Biofilms and Microbiomes*, 4(1), 7 (11 pp.). <https://doi.org/10.1038/s41522-018-0050-9>

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Bath toys pose an interesting link between flexible plastic materials, potable water, external microbial and nutrient contamination, and potentially vulnerable end-users. Here, we characterized biofilm communities inside 19 bath toys used under real conditions. In addition, some determinants for biofilm formation were assessed, using six identical bath toys under controlled conditions with either clean water prior to bathing or dirty water after bathing. All examined bath toys revealed notable biofilms on their inner surface, with average total bacterial numbers of 5.5×10^6 cells/cm² (clean water controls), 9.5×10^6 cells/cm² (real bath toys), and 7.3×10^7 cells/cm² (dirty water controls). Bacterial community compositions were diverse, showing many rare taxa in real bath toys and rather distinct communities in control bath toys, with a noticeable difference between clean and dirty water control biofilms. Fungi were identified in 58% of all real bath toys and in all dirty water control toys. Based on the comparison of clean water and dirty water control bath toys, we argue that bath toy biofilms are influenced by (1) the organic carbon leaching from the flexible plastic material, (2) the chemical and biological tap water quality, (3) additional nutrients from care products and human body fluids in the bath water, as well as, (4) additional bacteria from dirt and/or the end-users' microbiome. The present study gives a detailed characterization of bath toy biofilms and a better understanding of determinants for biofilm formation and development in systems comprising plastic materials in contact with potable water.

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Publication Type	Journal Article
Title	Ugly ducklings - the dark side of plastic materials in contact with potable water
Author(s)	Neu, Lisa (Environmental Microbiology UMIK) Bänziger, Carola (Environmental Microbiology UMIK) Proctor, Caitlin R. (Environmental Microbiology UMIK) Zhang, Ya Liu, Wen-Tso Hammes, Frederik (Environmental Microbiology UMIK)
Journal	npj Biofilms and Microbiomes
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A review on self-healing polymers for soft robotics

Terry S, Langenbach J, Roels E, Brancart J, Bakkali-Hassani C, Poutrel Q-A, Georgopoulou A, George Thuruthel T, Safaei A, Ferrentino P, Sebastian T, Norvez S, Iida F, Bosman AW, Tournilhac F, Clemens F, Van Assche G & Vanderborght B

Citation

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Terry S., Langenbach, J., Roels, E., Brancart, J., Bakkali-Hassani, C., Poutrel, Q. A., ... Vanderborght, B. (2021). A review on self-healing polymers for soft robotics. *Materials Today*, 47, 187-205. <https://doi.org/10.1016/j.mattod.2021.01.009>

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The intrinsic compliance of soft robots provides safety, a natural adaptation to its environment, allows to absorb shocks, and protects them against mechanical impacts. However, a literature study shows that the soft polymers used for their construction are susceptible to various types of damage, including fatigue, overloads, interfacial debonding, and cuts, tears and perforations by sharp objects. An economic and ecological solution is to construct future soft robotic systems out of self-healing polymers, incorporating the ability to heal damage. This review paper proposes criteria to evaluate the potential of a self-healing polymer to be used in soft robotic applications. Based on these soft robotics requirements and on defined performance parameters of the materials, linked to the mechanical and healing properties, the different types of self-healing polymers already available in literature are critically assessed and compared. In addition to a description of the state of the art on self-healing soft robotics, the paper discusses the driving forces and limitations to spur the interdisciplinary combination between self-healing polymer science and soft robotics.

Details

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A review on self-healing polymers for soft robotics

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Terry S, Seppe
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[Cui J](#), [Huang T-Y](#), [Luo Z](#), [Testa P](#), [Gu H](#), [Chen X-Z](#), [Nelson BJ](#) & [Heyderman LJ](#)

Citation

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Cui, J., Huang, T. Y., Luo, Z., Testa, P., Gu, H., Chen, X. Z., ... Heyderman, L. J. (2019). Nanomagnetic encoding of shape-morphing micromachines. *Nature*, 575(7781), 164-168. <https://doi.org/10.1038/s41586-019-1713-2>

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Shape-morphing systems, which can perform complex tasks through morphological transformations, are of great interest for future applications in minimally invasive medicine, soft robotics, active metamaterials and smart surfaces. With current fabrication methods, shape-morphing configurations have been embedded into structural design by, for example, spatial distribution of heterogeneous materials, which cannot be altered once fabricated. The systems are therefore restricted to a single type of transformation that is predetermined by their geometry. Here we develop a strategy to encode multiple shape-morphing instructions into a micromachine by programming the magnetic configurations of arrays of single-domain nanomagnets on connected panels. This programming is achieved by applying a specific sequence of magnetic fields to nanomagnets with suitably tailored switching fields, and results in specific shape transformations of the customized micromachines under an applied magnetic field. Using this concept, we have built an assembly of modular units that can be programmed to morph into letters of the alphabet, and we have constructed a microscale 'bird' capable of complex behaviours, including 'flapping', 'hovering', 'turning' and 'side-slipping'. This establishes a route for the creation of future intelligent microsystems that are reconfigurable and reprogrammable in situ, and that can therefore adapt to complex situations.

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Nanomagnetic encoding of shape-morphing micromachines

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Glacier runoff variations since 1955 in the Maipo River basin, in the semiarid Andes of central Chile

Ayala Á, Fariás-Barahona D, Huss M, Pellicciotti F, McPhee J & Farinotti D

Citation

APA

Ayala, Á., Fariás-Barahona, D., Huss, M., Pellicciotti, F., McPhee, J., & Farinotti, D. (2020). Glacier runoff variations since 1955 in the Maipo River basin, in the semiarid Andes of central Chile. *Cryosphere*, 14(6), 2005-2027. <https://doi.org/10.5194/tc-14-2005-2020>

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As glaciers adjust their size in response to climate variations, long-term changes in meltwater production can be expected, affecting the local availability of water resources. We investigate glacier runoff in the period 1955–2016 in the Maipo River basin (4843 km², 33.0–34.3° S, 69.8–70.5° W), in the semiarid Andes of Chile. The basin contains more than 800 glaciers, which cover 378 km² in total (inventoried in 2000). We model the mass balance and runoff contribution of 26 glaciers with the physically oriented and fully distributed TOPKAPI (Topographic Kinematic Approximation and Integration)-ETH glacio-hydrological model and extrapolate the results to the entire basin. TOPKAPI-ETH is run at a daily time step using several glaciological and meteorological datasets, and its results are evaluated against streamflow records, remotely sensed snow cover, and geodetic mass balances for the periods 1955–2000 and 2000–2013. Results show that in 1955–2016 glacier mass balance had a general decreasing trend as a basin average but also had differences between the main sub-catchments. Glacier volume decreased by one-fifth (from 18.6±4.5 to 14.9±2.9 km³). Runoff from the initially glacierized areas was 177±25 mm yr⁻¹ (16±7 % of the total contributions to the basin), but it shows a decreasing sequence of maxima, which can be linked to the interplay between a decrease in precipitation since the 1980s and the reduction of ice melt. Glaciers in the Maipo River basin will continue retreating because they are not in equilibrium with the current climate. In a hypothetical constant climate scenario, glacier volume would reduce to 81±38 % of the year 2000 volume, and glacier runoff would be 78±30 % of the 1955–2016 average. This would considerably decrease the drought mitigation capacity of the basin.

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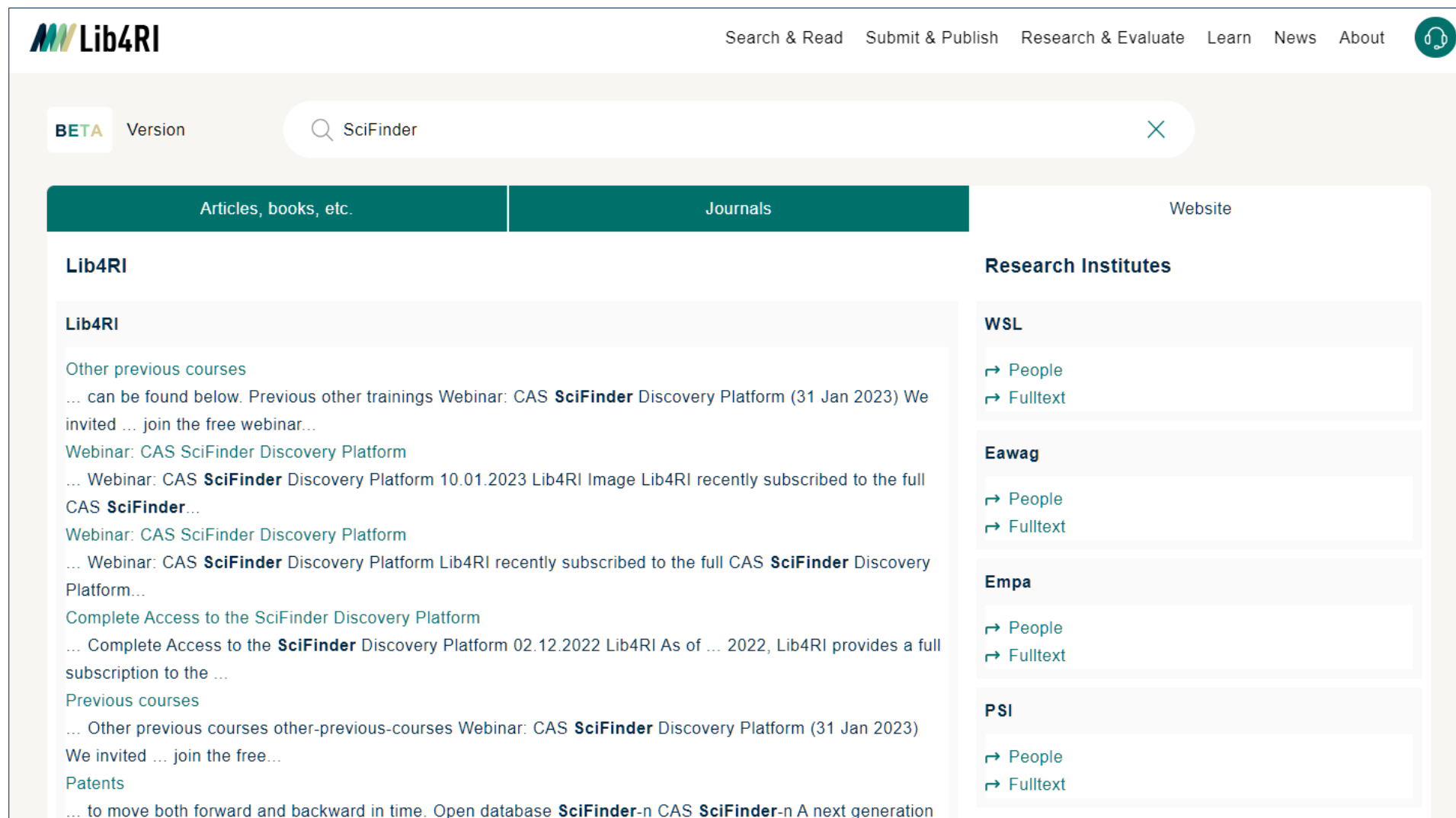
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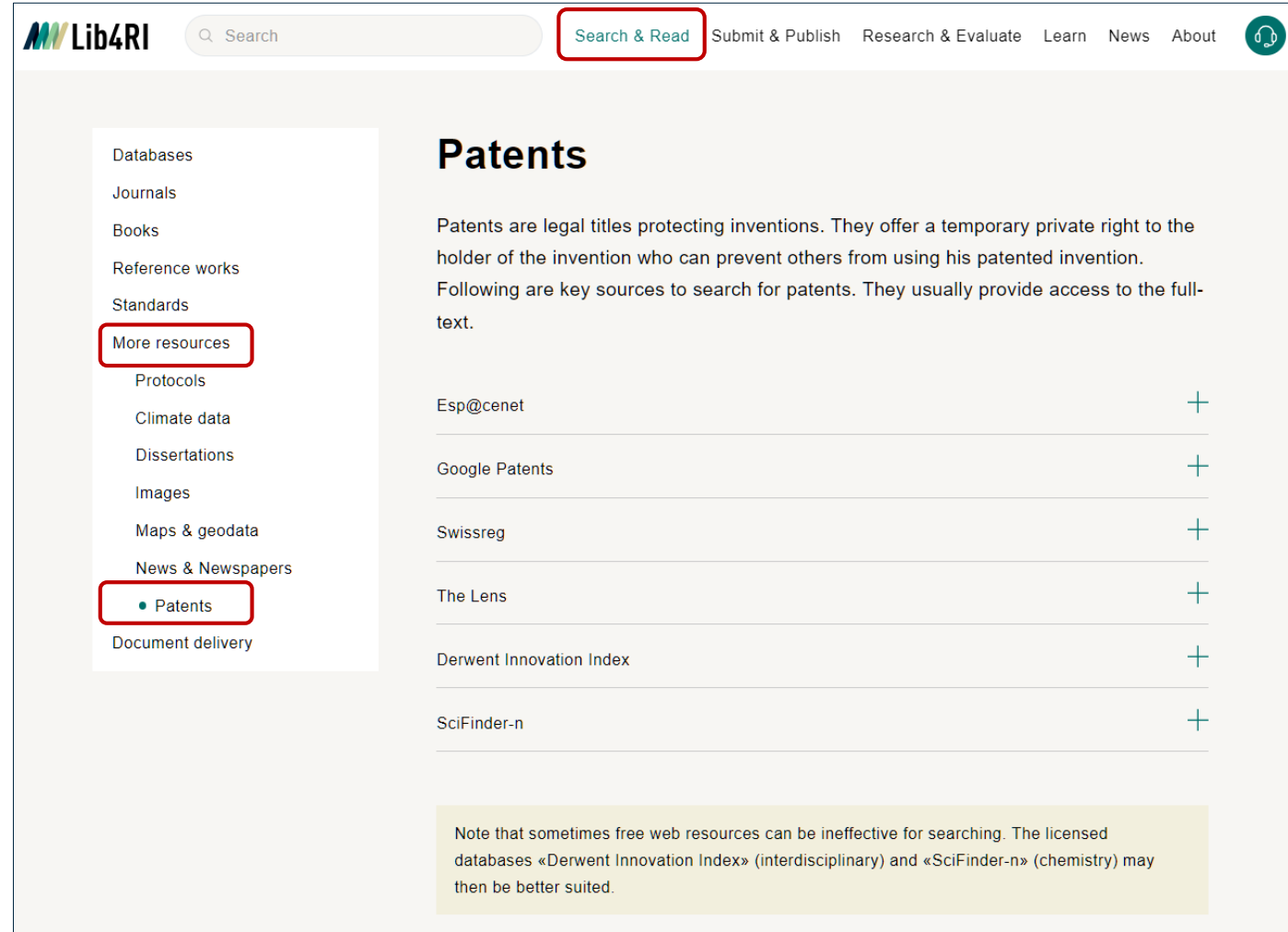
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The screenshot shows the Lib4RI website interface. At the top, there is a navigation bar with the Lib4RI logo on the left and links for Search & Read, Submit & Publish, Research & Evaluate, Learn, News, and About on the right. A search bar is located below the navigation bar, containing the text "SciFinder". Below the search bar, there are three tabs: "Articles, books, etc.", "Journals", and "Website". The "Website" tab is currently selected. The main content area is divided into two columns. The left column is titled "Lib4RI" and contains a list of links and text, including "Other previous courses", "Webinar: CAS SciFinder Discovery Platform", and "Complete Access to the SciFinder Discovery Platform". The right column is titled "Research Institutes" and contains three sections: "WSL", "Eawag", and "Empa". Each section has links for "People" and "Fulltext".

Searching - Patents

- Info on our website www.lib4ri.ch
Search & Read > More Resources
> Patents
- A specialist is required for a more comprehensive patent search.



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Images
Maps & geodata
News & Newspapers
• Patents
Document delivery

Patents


Patents are legal titles protecting inventions. They offer a temporary private right to the holder of the invention who can prevent others from using his patented invention. Following are key sources to search for patents. They usually provide access to the full-text.


Esp@cenet	+
Google Patents	+
Swissreg	+
The Lens	+
Derwent Innovation Index	+
SciFinder-n	+

Note that sometimes free web resources can be ineffective for searching. The licensed databases «Derwent Innovation Index» (interdisciplinary) and «SciFinder-n» (chemistry) may then be better suited.

Not found ...

- Document Delivery and Interlibrary Loan (ILL) Service
- Free of charge for members of Eawag, Empa, PSI & WSL




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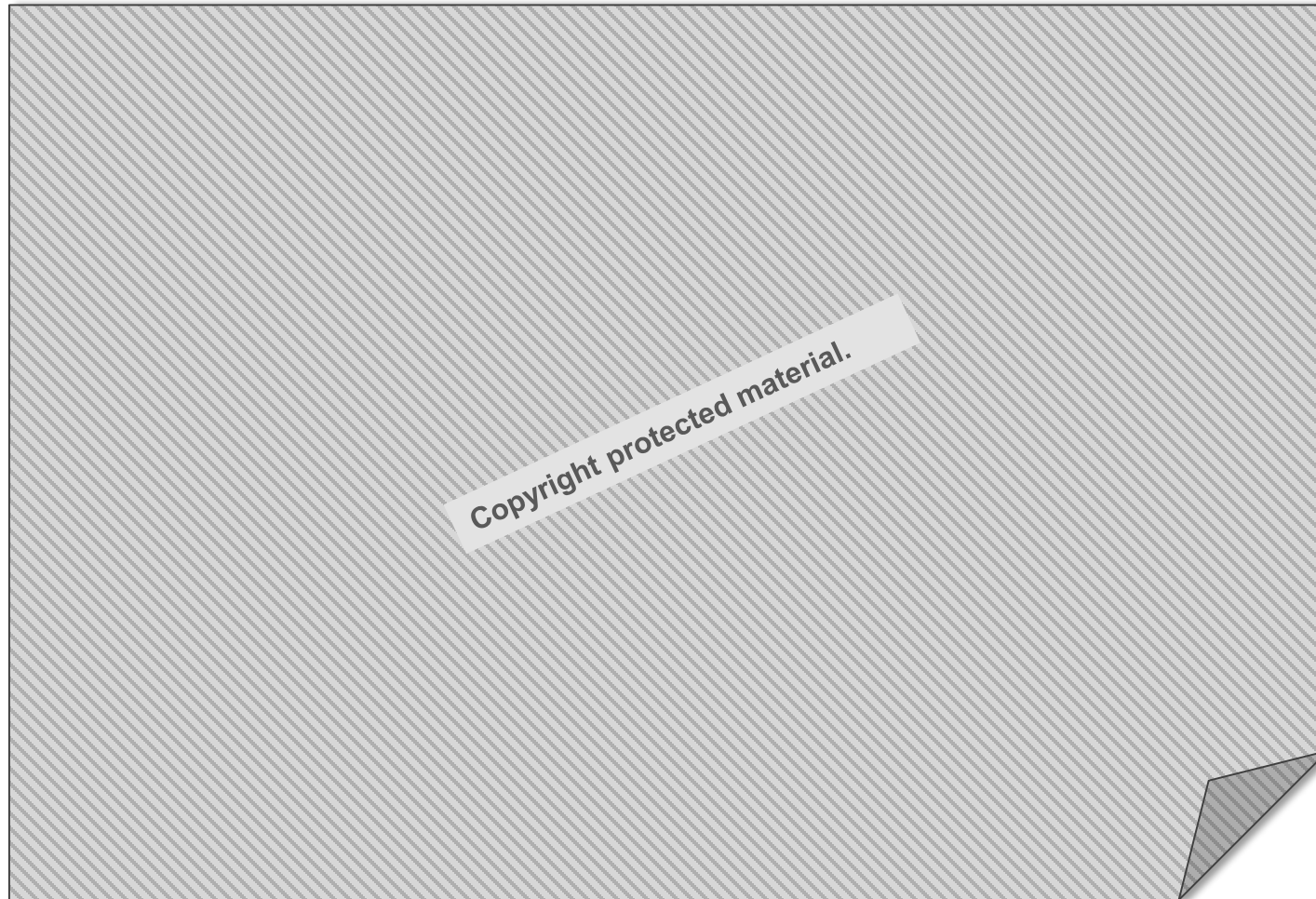
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- **Fees:** The service is free of charge and only available to affiliates of the four research institutes within the ETH Domain (Eawag, Empa, PSI and WSL).

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Any questions? We are happy to help!



Thanks for your interest, keep being curious!

Stephanie Hofmann & Bobby Neuhold
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