

Wearable biosensors for glucose monitoring in sweat: a patent analysis

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INTRODUCTION & AIM

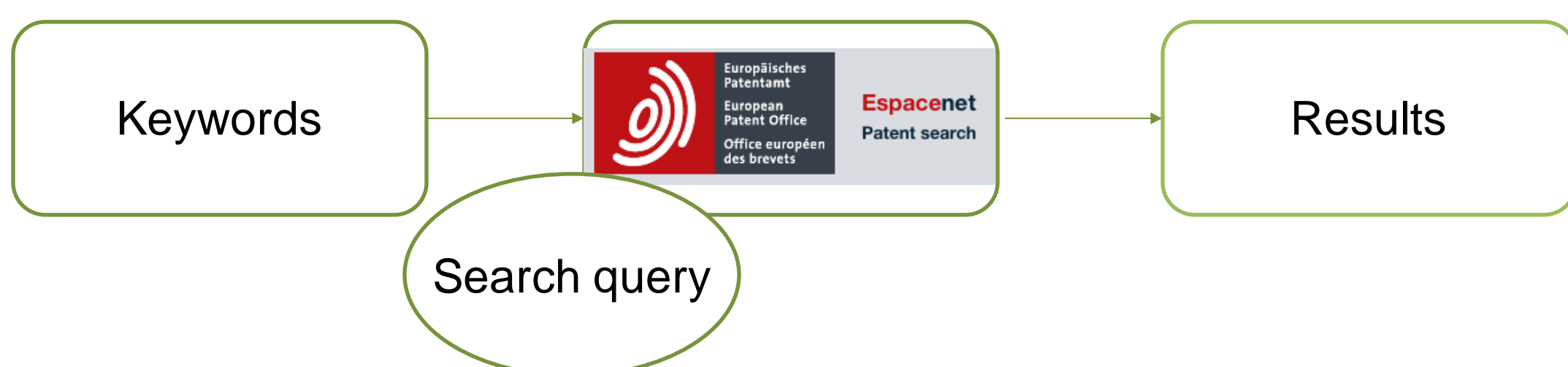
Metabolic diseases and their impact on personal and community health and quality of life as well they have relevant economic implications. This situation is growing in most countries in the world.

The management of these pathologies uses micro-sampling blood analysis as gold standard technology, while **non-invasive glucose monitoring** is the strategic innovation pathway and yet unresolved challenge.

From this purpose, the choice of the biological fluid is the key decision. Sweat represents the most suitable medium for non-invasive sensing and monitoring of glucose than other bodily fluids, such as saliva, tears, or urine, for its accessibility and management. Indeed, the measurement of glucose levels in sweat needs the use of highly precise and sensitive sensors, given the low glucose concentration in sweat, in a well structured procedure.

This study aims to provide a comprehensive overview of the **patent landscape** related to wearable biosensors for the monitoring of **glucose levels in sweat**.

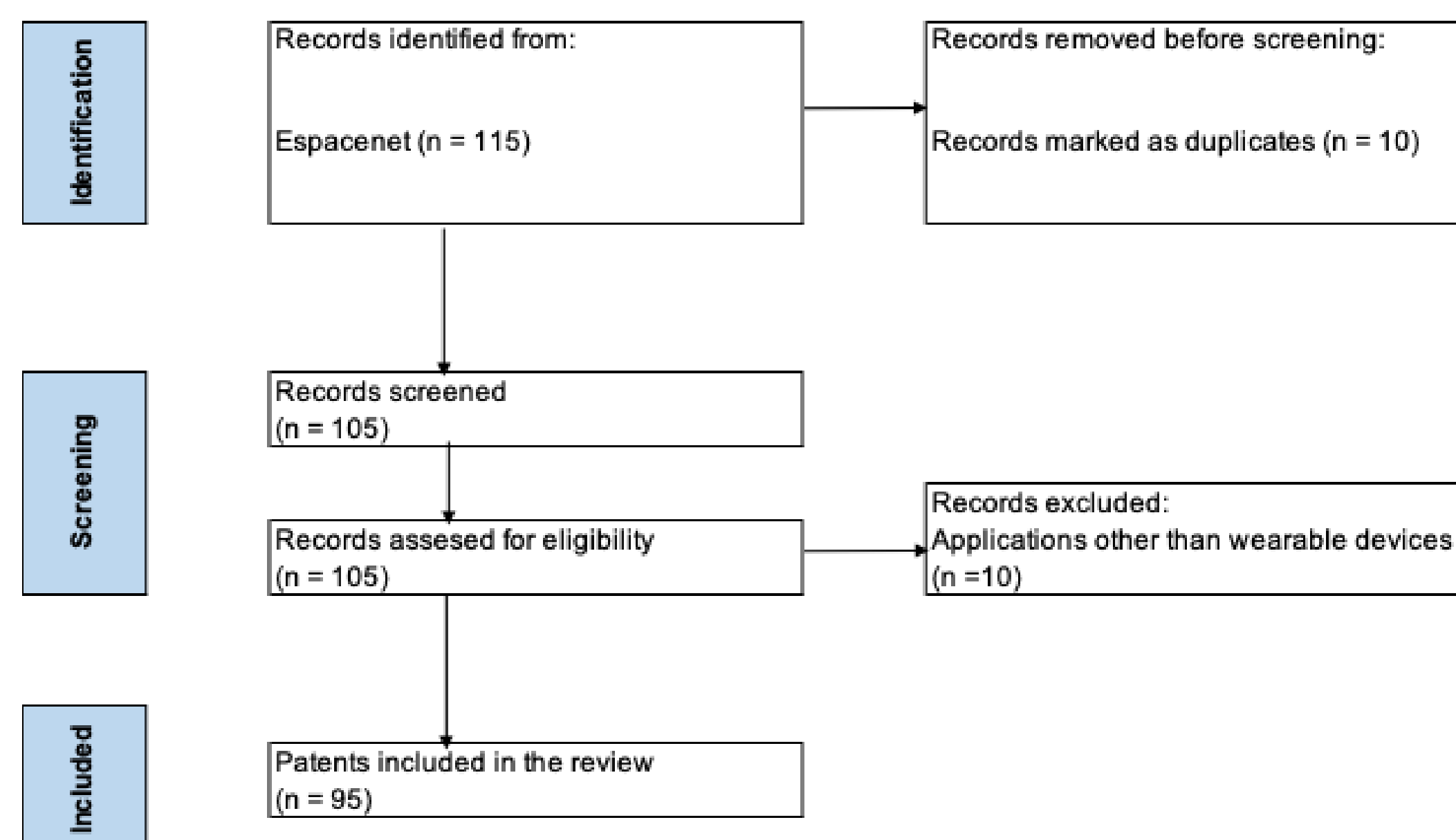
METHOD



Patents' data were retrieved from Espacenet database (<http://www.espacenet.com>), provided by the European Patent Office and freely accessible.

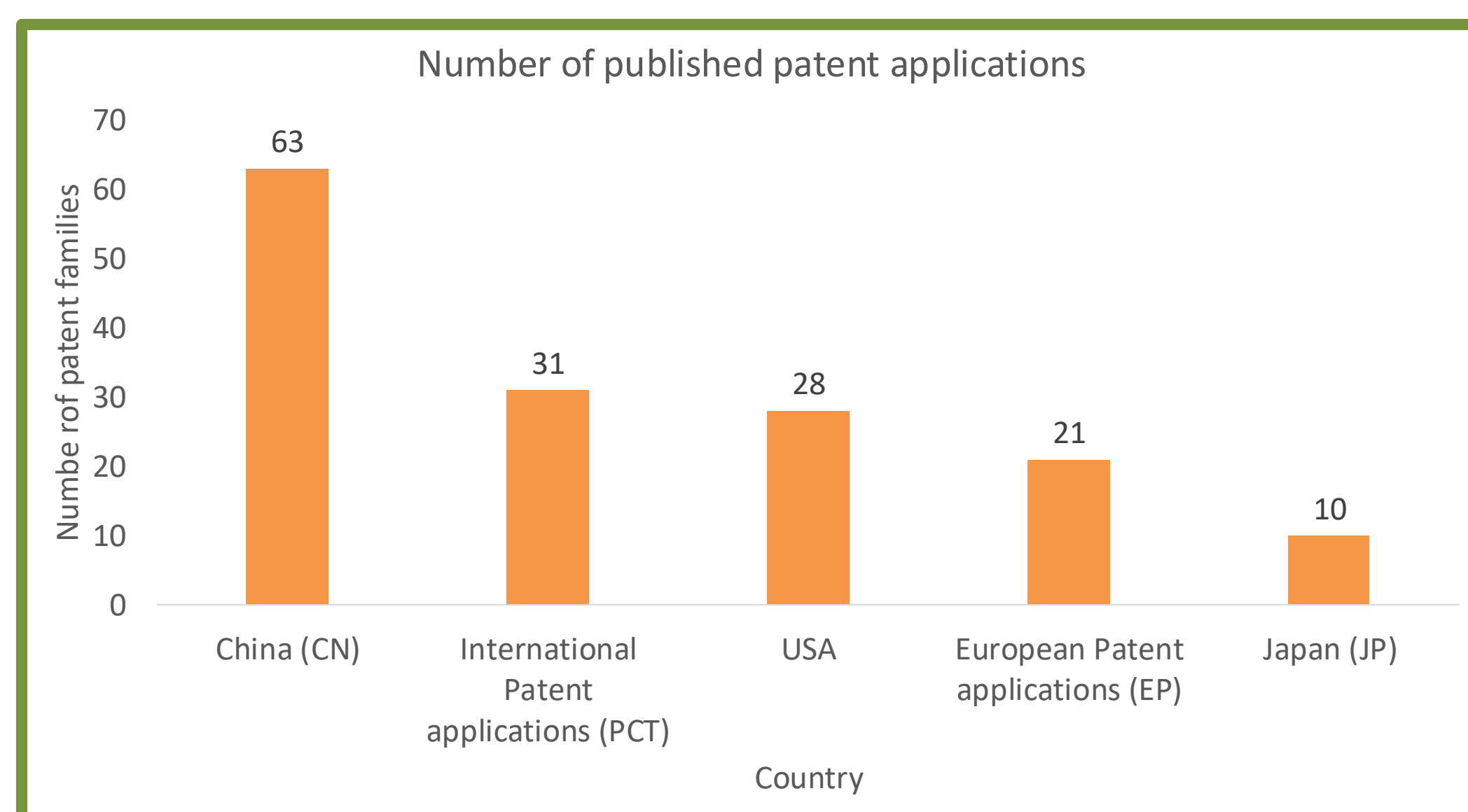
The search strategy was based on three main keywords: "wearable" AND "sweat" AND "glucose". A set of single sub-keyword allowed for further data retrieval and clustering.

Identification of patents via Espacenet

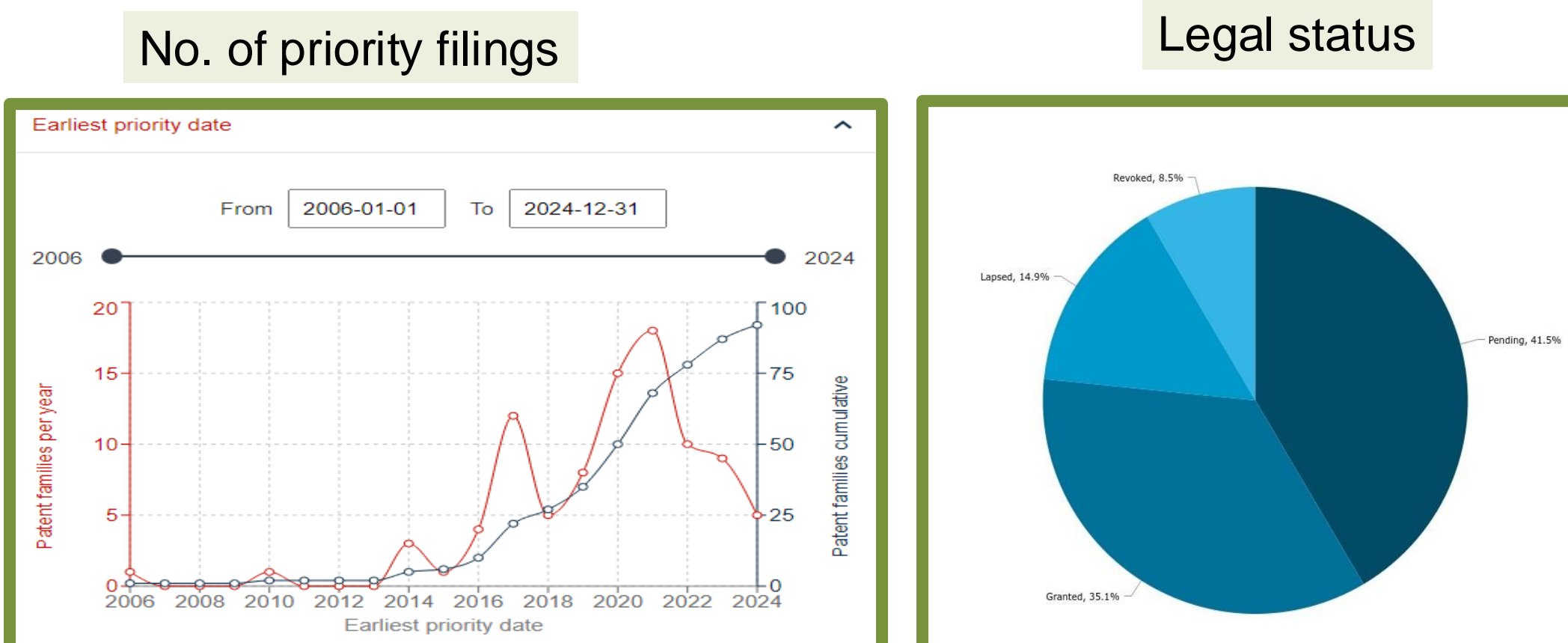


RESULTS & DISCUSSION

A total of **115 records** were collected from Espacenet. After excluding duplicates or related to other applications than wearable devices, **95 records** were included in the review. China (63) is the country with the highest number of filings, followed by the USA (28) and Europe (21).



The first application was filed in 2006; however, it was not until 2014 that an upward trend in filings became evident, with notable peaks in 2017 and 2021. A total of 41.5% of the applications are currently pending, while only 35.1% have been granted patents.



Most of claimed electrochemical sensors are enzymatic sensors. **Graphene** represents the most prevalent carbon material utilized in the electrode, followed by rGO and carbon nanotubes. The employment of **MXenes** and **MOF** is comparatively limited. The power supply is another key issue: the power unit may include a solar cell, a fuel cell, or a lithium-ion battery, but preferably a small-sized lithium battery is used.

CONCLUSION

This preliminary study could be expanded and augmented with further contributions from the scientific literature. From a patent perspective, the number of patent filings continues to increase, particularly in China, which is the leading country in terms of the number of patent applications.