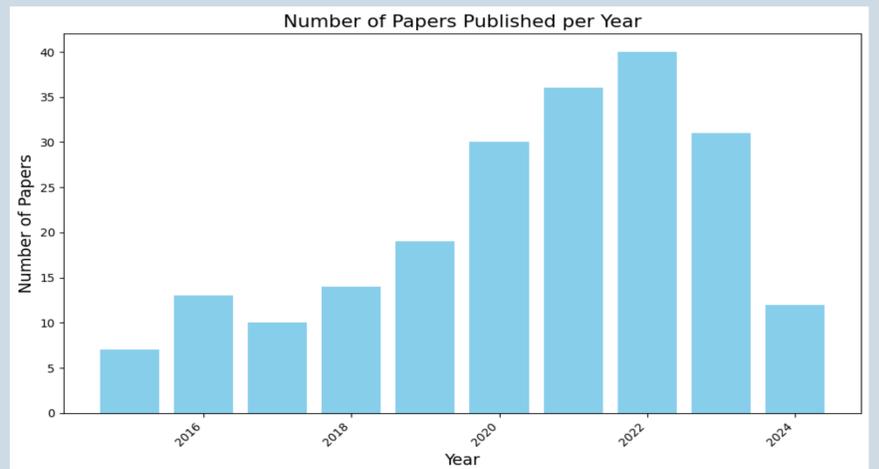


## Bibliometric analysis on photocatalytic

analyzed data from 6,806 articles on electrochemical water treatment technologies published between 2000 and 2022. This study revealed that interdisciplinary research integrating photocatalysis with electrochemical systems has gained significant attention. This research classified the evolution of photocatalytic water treatment into three stages: the foundational stage (2000–2010), which focused on the fundamental understanding of photocatalytic reactions; the development stage (2011–2017), marked by advancements in catalyst efficiency; and the expansion stage (2018–2022), which emphasized large-scale implementation and commercial applications. Despite the rapid growth in this field, the study pointed out that cost constraints, low photocatalytic conversion rates, and lack of efficient storage solutions remain critical challenges for large-scale adoption.



The summary of the annual publication count for photocatalytic applications in water treatment from 2015 to 2024. Over time, there has been a considerable increase in research activities, especially after 2019. However, a large increase is seen beginning in 2019, with 19 publications, followed by a steady rise to a peak of 40 publications in 2022. This rise indicates an increasing interest in the topic, which could be attributed to advances in photocatalytic materials and their environmental applications.

The increasing number of publications in the last decade demonstrates the growing importance of photocatalysis in water treatment research, reflecting ongoing scientific discoveries and interest in sustainable water purification methods.

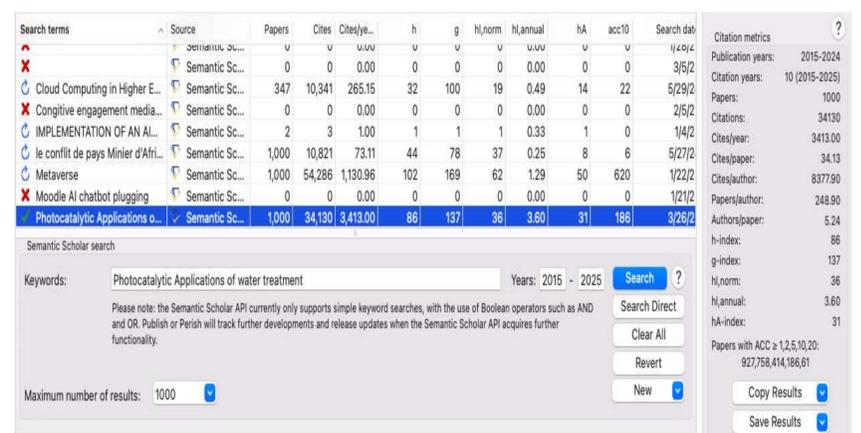
### Introduction

Bibliometric analysis is a valuable method for examining large volumes of scientific literature and identifying trends, patterns, and research gaps. It integrates the quantitative approach of meta-analysis with the qualitative insights of a systematic literature review, strengthening the overall understanding of a field. Using bibliometric techniques, researchers can systematically assess the development and evolution of scientific inquiry, particularly within the domain of photocatalytic water treatment systems. Methods such as citation analysis, co-authorship network analysis, and keyword co-occurrence mapping provide structured insights into the intellectual landscape of a research area, thereby facilitating a comprehensive evaluation of advancements in water treatment technologies. This study employed bibliographic coupling and co-occurrence analyses to achieve its objectives.

### Methodology

The search was conducted on March 27, 2025, using the Semantic database on photocatalytic systems for water treatment. The core keywords used were water treatment, photocatalytic application, and bibliometric analysis of the developed research questions. To enhance the search string, the term photocatalytic was extended to degradation and bibliometric analysis, whereas the term farm was extended to the plant. It was also employed to locate any papers that have the same root word. To guarantee the selection of pertinent articles, a filtering feature in the Semantic database was employed. Recent 10 years articles between 2015 to 2025.

### Methodology result



The semantic database was utilized to retrieve the required articles for analysis after these keywords had been searched. The number of initial documents obtained was 1000 articles, has shown above which visualizes the overall selection process for the selected articles.

### Bibliometric Analysis Result

