



PRISMA 2020 Checklist

Data for the paper titled A systematic review of the most recent concepts in smart windows technologies with a focus on electrochromics.

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Identified in the title: "A systematic review of the most recent concepts in smart windows technologies with the focus on electrochromics"
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Abstract checklist included as a separate document.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	<p>Abstract</p> <p>"The purpose of this paper is to provide a systematic review of recent technological innovations in the field of smart windows and present the possibilities of recently established functionalities".</p> <p>Chapter Introduction</p> <p>"Smart glass greatly influences the building envelope performance in (i) thermal management; (ii) daylight harvesting and regulation; (iii) reduction of glare; (iv) maintenance of views; (v) power capture, and finally also (vi) activating the envelope as information display"</p>
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	<p>Abstract</p> <p>"The purpose of this paper is to provide a systematic review of recent technological innovations in the field of smart windows and present the possibilities of recently established functionalities."</p> <p>Introduction</p> <p>"This review aims to present the most recent concepts in active smart glazing that present possible – available in the future – functionalities, without deeply diving into the issues of material engineering. It is hoped, that the materials that are currently in the stage of development would finally result in commercially available products in the building industry."</p>
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	The present paper gives a bird's eye view on novel active smart glass technologies (active meaning = dimming on demand) with the focus on electrochromic devices (further addressed as ECDs) which appeared in the years 2015-2020 and were published.
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	The data for the review were acquired from international scientific databases (WOS and Scopus), form from the manufacturers' websites, and other open channels.
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	<p>Chapter 1.1: Aim of the paper and method</p> <p>The data for the review were acquired from international scientific databases (WoS and Scopus – last search 28th March 2021), and from the manufacturers' websites, and other open channels (). Search strategy for all databases included the papers that featured a word "smart glass", "smart window" and after the first refine was</p>



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			made, also “electrochromic” key words. Below-described solutions were studied and systematized to compare the most recent concepts and possible areas of future development in the years 2015-2020. The main/core scientific method that was used is a desk study.
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Chapter 1.1 Aim of the paper and method Search strategy for all databases included the papers that featured a keywords “smart glass”, “smart window” and – after the first refine was made – also “electrochromic” keyword. The review was carried out by a single researcher (an author), the inclusion algorithm (the procedure to decide which reports were included in the review) consisted of three steps: (i) whether the technology is able to “dim-on-demand”, (ii) whether the technology is reversible, (iii) coś dodać.
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Chapter 1.1 Aim of the paper and method The review was carried out by a single researcher (an author). The main/core scientific method that was used is a desk study.
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	The time frame was defined in the chapter 1.1. The data were sought in the frame of 2015-2020. In general the data was sought for the Δt which is the difference in transmittance in the bleached and dimmed state. However, the authors are giving the results in the different metrics. This was addressed in the chapter 3. “The objective of this work is also to provide the readers with information about the smart window properties, however, it has to be stressed, that the information about the characteristics is difficult to systematize, as the researchers are using different metrics. Quantitative information for luminous (lum) $T_{lum/vis}$ and solar (sol) T transmittance are frequently given. Other authors describe the change of light-transmitting properties by describing the modulation of ΔT which is conveniently characterized by the formula (1). The modulation will be used thought the paper to characterize the presented solutions and technologies.
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Results of individual studies were presented in the form of the tables, comparing the different results achieved by individual teams of researchers. No statistical synthesis was conducted. The risk of missing or including unclear information from the reported studies is limited, as a single smart window technology is derived from at least a few sources. This fact increases the credibility of information and reduces the risk of bias.
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	The inclusion algorithm (the procedure to decide which reports were included in the review) consisted of three steps: (i) whether the technology can “dim-on-demand”, (ii) whether the technology is reversible, (iii) the reported technology reached the



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			stage of a small-scale working prototype (big enough to measure the optical transmittance). Certain studies were ineligible to be included in the review as the outcomes were out of the scope of the interest e.g. because the results were not scalable or the technology did not reach the stage of the working prototype.
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	An excel sheet, comparing values.
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	The values of Δt presented in the tables all over the paper.
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	No statistical synthesis was conducted.
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A, not such an analysis was performed. The heterogeneity results from the different technologies that are used and in the presented paper is visualized in the tables representing the Δt results.
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	No sensitivity analysis was performed.
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	No missing results were reported. Some reports were excluded from the review, based on the "Data inclusion algorithm". See above.
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	According to https://training.cochrane.org/handbook/current/chapter-13 failure to consider the potential impact of non-reporting biases on the results of the review "can lead to the uptake of ineffective and harmful interventions in clinical practice ". The presented systematic review is not a case of medical research (it is a strictly engineering review), therefore no all parts of the Cochrane procedure are present
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Flow diagram attached. The inclusion strategy was described in the chapter 1.3
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	
Study characteristics	17	Cite each included study and present its characteristics.	All included reports are properly cited in the "Reference" section of the paper.
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	N/A According to https://training.cochrane.org/handbook/current/chapter-08 risk of bias is assessed in the medical randomized trials
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured	N/A According to https://training.cochrane.org/handbook/current/chapter-08 risk of bias is



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		tables or plots.	assessed in the medical randomized trials
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A. No statistical synthesis was conducted. Presented paper is a review of different smart window technologies.
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	N/A. No statistical synthesis was conducted. Presented paper is a review of different smart window technologies.
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A. No statistical synthesis was conducted. Presented paper is a review of different smart window technologies.
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A. No statistical synthesis was conducted. Presented paper is a review of different smart window technologies.
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Reported in the paper. "Risk of bias due to missing results is marginal, as the results come from numerous sources included in the paper."
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	No certainty of evidence is presented.
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Reported in the paper. Although it is needed to exercise caution in interpreting these presented data because of the limited number of reviewed papers (105), these findings nonetheless appear to be largely in line with systematic reviews by other researchers [Błąd! Nie można odnaleźć źródła odwołania., Błąd! Nie można odnaleźć źródła odwołania.].
	23b	Discuss any limitations of the evidence included in the review.	Reported in the paper.
	23c	Discuss any limitations of the review processes used.	Reported in the paper.
	23d	Discuss implications of the results for practice, policy, and future research.	Reported in the paper.
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	N/A PROSPERO is an international database of prospectively registered systematic reviews in health and social care, welfare, public health, education, crime, justice, and international development, where there is a health related outcome
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Review protocol was not prepared
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Review protocol was not prepared
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Reported in the paper.
Competing interests	26	Declare any competing interests of review authors.	Reported in the paper. No competing interests are declared.



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Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	The Prisma checklist and Prisma flow diagram are available as an additional materials.

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