

# Literature Search Strategy

*B. P. Reed and N. Davies*

*October 27, 2013*

Before any experimental project is undertaken, it is important to ascertain a broad understanding of the field that the project falls under. Typically, this is achieved by reviewing literature in the field relevant to aims of the project. Finding the right literature initially requires a holistic approach to ensure that no important papers are missed, but also demands a critical focus on only the most applicable of the set; such a process needs to be dictated by a meticulous search strategy. This report will outline the process used by the authors, show examples of some search terms used, and provide some commentary on the search results.

The project being undertaken by the authors is entitled *“Directed deposition of photovoltaic inks using clay particles”*. In short, the experimentation will require the use of clay particles and sedimentation dynamics to deposit copper indium gallium (di)selenide nanoparticles (a.k.a ”CIGS”) onto a lime glass substrate, thus producing a thin film photovoltaic cell. Given that the methodology is a new idea, finding papers specific to the exact project abstract will be highly unlikely. It was decided that the literature search should cover four fields in order to find any overlap: CIGS inks and photovoltaics; clay particles and sedimentation dynamics; small angle X-ray scattering (SAXS); and mineralogical X-ray diffraction. Following the preliminary search, a suitably broad set of papers were obtained for each specific field. The search terms used and hits produced have been compiled into tables 1 to 4. For each search, “clays” was used as a unifying search term to ensure that there was some overlap in the results, and also because the proposed method of CIGS ink deposition is dependant on it.

Search terms	Hits	Comments
“SAXS”	13,489	Extremely large set, strict refinement needed.
“SAXS” AND “IN SITU”	1,014	Significant reduction, however still quite general. More search terms required.
“SAXS” AND “IN SITU” AND “CLAYS”	57	Acceptable set size.

Table 1: *Search terms used for the SAXS literature search.*

Search terms	Hits	Comments
“SEDIMENTATION”	139,846	Extremely large set, lots of refinement required.
“SEDIMENTATION” AND “DYNAMICS”	7,406	Set has been reduced significantly, however is still too large.
“SEDIMENTATION” AND “DYNAMICS” AND “CLAY”	211	Closer to an acceptable set. Suggest ”formation” as a search term.
“SEDIMENTATION” AND “DYNAMICS” AND “CLAY” AND “FORMATION”	45	Acceptable set.

Table 2: *A small selection of the search terms used to explore the field of sedimentation dynamics.*

Search terms	Hits	Comments
“CIGS”	1,924	Too many results, specify clay use.
“CIGS” AND “CLAY”	0	Use of clays and CIGS together is new, hence no results. Broaden search to ‘deposition’ in reference to sedimentation of inks.
“CIGS” AND “DEPOSITION”	628	Better set of results but still too large.
“CIGS” AND “DEPOSITION” AND “INKS”	20	Acceptable set of papers.

Table 3: *A small selection of the search terms used to explore the field of CIGS thin films.*

Search terms	Hits	Comments
“X RAY DIFFRACTION”	461,540	Extremely large set, large reduction needed.
“X RAY DIFFRACTION” AND “CLAY”	9,962	Large reduction, however still too large.
“X RAY DIFFRACTION” AND “CLAY” AND “SEDIMENTATION”	108	Attempt to reduce further using terms relating to other searches.
“X RAY DIFFRACTION” AND “CLAY” AND “SEDIMENTATION” AND “FORMATION”	37	Acceptable set size

Table 4: A selection of the search terms used to explore X-ray diffraction on clay sedimentation.

The total number of abstracts compiled for further discussion was 129, covering the four fields previously discussed. Not all of the papers that were returned by the searches were added to the abstract list, either because they fell outside the bounds of the project, or they were vetoed by the authors because they were unusable.

The abstracts were then colated into a single text file and ran through several keyword analysers, the two most notable of which were Wordle<sup>1</sup>, and Seobook Keyword Density Analyser<sup>2</sup>. Wordle was able to display a visual representation of the frequency of occurrence of keywords in our abstracts, whilst Seobook was able to provide quantitative data (e.g. the percentage of the total words in the abstracts that are ‘clay’). Using this information and critical discussion, it was possible to select 19 keywords to use in the filtering stage of the literature search; these keywords are shown in figure 1. Using these keywords, the most useful papers in the set (i.e. those with the greatest relevance to the topic and with the greatest overlap of all four fields) were isolated for further in-depth analysis.

Following this keyword filtering, 20 suitable papers were selected with an emphasis on sedimentation and X-ray diffraction, as these areas will be the most central to the project.

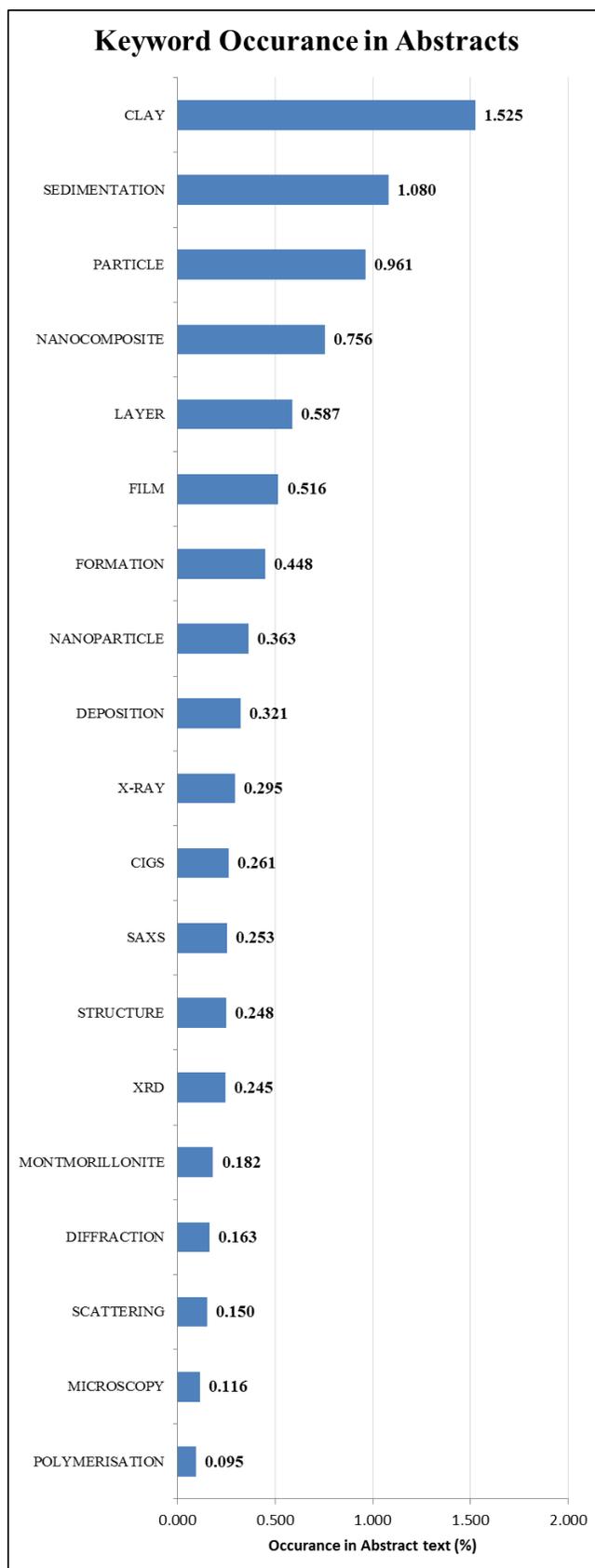


Figure 1: A bar chart of the occurrence of the 19 selected keywords in all of the abstracts compiled

<sup>1</sup>Wordle Keyword Visualiser: [www.wordle.net](http://www.wordle.net)

<sup>2</sup>Keyword Density Analyser: [www.seobook.com](http://www.seobook.com)