

Section 1. Research Writing Basics

Unit 4. Analysis of a research paper overall structure

Today we will summarize key points about the general structure of a research article by putting them into practice.

Thus, unit 4 will cover practical application of the knowledge gained by analyzing a particular article.

My two previous videos have been devoted to an overview of a research article structure. From the so-called front matter: title, author list with affiliations, abstract, keywords through the main body with its IMRD format to the back matter: acknowledgments, references and supplementary materials.

So, let's start the analysis of a real article!

We will take an article published in a scientific journal, that is, already approved and edited. All journals have certain guidelines where they set the format and structure of articles. In addition, all articles usually undergo peer-review. Papers deemed suitable are typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The final decision regarding acceptance or rejection of articles is taken by the editor. This means that both content and layout of the paper are checked and revised until everything is ready for publication.

For the sake of demonstration, I am going to [sciencedirect.com](https://www.sciencedirect.com). **ScienceDirect** is a website that provides access to a large bibliographic database of scientific and medical publications of the *Dutch publisher Elsevier*. This is a Dutch academic publishing company specializing in scientific, technical, and medical content with Scopus as its abstract and citation database.

You do know about Scopus, don't you? **Scopus** includes research in a wide variety of interdisciplinary topics but categorizes all their content into four categories: health sciences, life sciences, social sciences and physical sciences.

We open up an article. At the very top of the page, you can see **the name of the journal** – *Additive Manufacturing*, volume number – 30 and the year of publication – 2019. Below in capital letters you can read the name of the journal and its electronic page.

Now we are embarking on the article itself. The **title** – “*Towards digital metal additive manufacturing via high-temperature drop-on-demand jetting*” contains 9 words, some of which are compound – consisting of several parts: high-temperature and drop-on-demand.

Below the title comes the **list of authors**, made up of 8 first and last names. As could be seen, they do not come in the alphabetical order which has to reflect their degree of contribution to the research. You remember that the information about the authors should also include *affiliations or institutions* that they represent. Since in this case all the authors are affiliated with just two organizations, they are grouped accordingly and assigned to their organization with letters – a or b.

Below to the left there are **keywords**, five word-combinations. Word-combinations ensure a more productive search, since they are more specific and focus-oriented: not just jetting, but drop-on-demand jetting, for example.

To the right there is an **abstract**. Structured according to a small IMRD model, it introduces the field, indicates novelty, describes methods and results and offers prospects.

The main body of the article opens with the **introduction**, which identifies a gap in current research. The authors thus propose a novel technique and promise to explain how this simple approach can lead to the production of structures of various complexity unveiling both the technical and materials science challenges associated with this approach to manufacturing.

Methods section is subdivided into special blocks – *Materials*, the *Process* and its tuning, followed by other appropriate subsections. When needed, the process is illustrated with figures and tables.

The next section deserves a little commentary. Although IMRD format presupposes separate sections on results and discussion, it is not uncommon to unite these two sections into one. Since logically they are interconnected, sometimes authors prefer to present findings alongside corresponding interpretation. This becomes the longest section in the article, making up 3 pages out of 9.

The **conclusion** section offers a summary of the findings and implications. However common all sections usually are, there is always scope for variation. Let's consider an optional section – called *Declaration of competing interest or Conflict of interest*.

What is it and what kind of interest do they mean? It means that authors must identify and declare any personal circumstances or interest that may be perceived as influencing the representation or interpretation of reported research results. All authors must disclose all relationships or interests that could inappropriately influence or bias their work. What kind of conflict may there be? It might be any role of the funding sponsors in the choice of research project; design of the study; in the collection, analyses or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

In other words, no one should interfere with the authors' ability to conduct independent research. If there is no conflict of interest, authors state "The authors declare no conflict of interest."

This statement does not contradict the essence of the acknowledgement section where authors express gratitude for support, funding or help. This support should not guide their decisions. Some journals have separate statements for funding and acknowledgements for different kinds of support.

This article also has an **appendix** which incorporates supplementary but important information. If you are writing a master thesis, you will have to include appendices at the very end of your research paper. However, within a journal issue it might be strange to isolate an appendix from the corresponding article. That is why in this case it is located just after the acknowledgement. In the article under consideration the appendix includes different tables and equations.

Finally, the article ends with the **reference section**. You probably remember from our previous video that every reference cited in the text should also be present in the reference list. They are usually numbered in order of appearance in the text (including table captions and figure legends) and listed individually at the end of the manuscript. **Reference style** depends on the choice of the journal – this looks like *ACS style*, which is the publication style developed by the American Chemical Society, and is commonly used for chemistry writing.

To sum up, today we have looked at real implementation and application of structural components that we have covered in the previous videos. This structural framework is not just about theory and knowledge, it is about real-life academic writing and publishing. Whether these are international journals or Russian journals, the standards of academic writing tend to converge. Now that you know the overall structure we are ready to dive into analysis of each IMRD component separately. Thank you for attention and see you soon!