



Thesis writing



UNIVERSITY  
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# Introduction – Engineering example

## Example: introduction to a thesis

Advanced ceramic materials such as zirconia have great potential as substitutes for traditional materials in many engineering applications; however, a number of problems have thus far restricted their use by engineers. Two of the major problems are difficulties in producing products of reliable and consistent quality, and the high cost of manufacture.

*identifies topic,  
problem and specific  
focus*

Recently, interest has been growing in alternative sintering techniques that could overcome this problem. One of the most promising is the use of microwaves to sinter ceramic compacts. Microwave sintering has many attractive features, including rapid volumetric heating and low cost. The equipment for microwave sintering is also less costly than that required for conventional processes and requires less maintenance. With energy savings calculated to range from 25 to 95 % and higher production rates, this process is commercially attractive. Microwave sintering may have other advantages as well, as there is some evidence that the mechanical properties of microwave-sintered ceramics are superior to those of conventionally sintered ceramics. This superiority has been largely attributed to the smaller grain sizes resulting from the short, rapid sintering cycle. ...

*indicates opportunities  
for new research in the  
field*

Until now, there has been no report of any systematic study of the microstructures produced by microwave sintering, or their relationship to the properties of the sintered product. The aims of this project were to develop a simple technique for microwave sintering of yttria zirconia, and to compare the resultant properties and microstructure with material sintered by conventional constant heating rate processes. The relationships between density and grain size were studied in order to determine whether microwave heating altered the densification/grain growth relationship. Such a change would indicate a change in the predominant mechanism of mass transfer. The effects of heating rate and yttria content were also investigated.

*identifies specific gap  
in knowledge that this  
research will fill*

*aims of this research*

