

# Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website [www-csc.utt.fr](http://www-csc.utt.fr))

Supervisor's name :  Given names :

Status (prof., assistant prof., ...) :

Laboratory :  Website address :

Institution :  Website address :

Scientific competence of the supervisor:

Ultrasound, Transducers & Systems, Piezoelectric Materials & Devices, Electrical and Electronic Engineering

Two major publications in the field proposed for the PhD :

1.
2.

Website address of the personal page :

**Supervisor's email :**

**Description of the research work proposed for a PhD** **Topic # (see list) :**

Title :

Subject :

Ultrasonic waves have proven to be a very efficient way to obtain images and quantified data from complex media in applications such as medical diagnostics and industrial defect detection, just to name a few. This is due to the fact they are non-ionizing, to their relatively low cost and ease of use as well as to their non-invasive and non-destructive character. Acoustic microscopy is a technique that uses high-frequency ultrasonic waves that allow both images and mechanical & structural properties of small objects to be obtained at microscopic scale. It is currently used in fields such as microelectronics and MEMS characterisation, but no research has been published on its use to study artefacts from archaeological sites. Ceramic artefacts are a current family of objects that can reveal valuable archaeological information. Indeed their composition, porosity, rigidity and structural characteristics depend on the type of raw material they are made of, their fabrication technique and their use. This PhD project aims at using acoustic microscopy as a technique to obtain quantitative parameters of ceramic samples from different periods and geographical sites in order to determine its potential for archaeological studies. Particular attention will be paid to the effect of porosity on acoustic properties. Both classical measurements and imaging, as well as the V(z) acoustic signature method will be investigated. Different archaeological materials such as metals and glass will also be tested

Keywords :

ultrasonic waves, non-destructive evaluation, archaeological materials

Expected collaborations :

Co-supervision with Laboratoire Archéologie et Territoires (Tours), possible collaborations with other archaeological research groups including (but not limited to): Centre de Recherche sur la Physique Appliquée à l'Archéologie (Bordeaux), Institut de Recherche sur les Archéomatériaux (Orléans).

Background required from the applicant :

The candidate should be trained in applied physics or engineering and have strong experimental expertise as well as some modelling capabilities. A Masters level degree that includes courses in electronics/electrical engineering and/or materials science and/or signal processing and/or mechanical engineering is required, ideally in the field of acoustics / ultrasound. There is no need to have specific competencies in archaeology, but the candidate should be open-minded and curious towards human science, including history.

Existence of a PDF file detailing the proposal ("yes" or "no") :

(see guidelines on the website [www-csc.utt.fr](http://www-csc.utt.fr))