Ultrafast_RAZipol Deliverable Report

Ultrafast Laser with Radial and Azimuthal Polarizations for High-efficiency Micro-machining Applications

Context		
Deliverable Title	D8.8 Project Video	
Organisation name of lead contractor	USTUTT	
Author(s)	Deborah Trabut	
Work Package & Task	WP8 – Task 8.1	
Deliverable due date	April 2014 (M06)	
Document Status		
Version No.	1.0	
Nature	Other	
Dissemination level	PU (Public)	
Last Modified	12.03.15	
Status	DRAFT	
Date Approved	18.03.15	
Approved & signed by Coordinator	Dr. Marwan Abdou-Ahmed (USTUTT)	Signature: 
Declaration	Any work or result described therein is genuinely a result of the Ultrafast_RAZipol project. Any other source will be properly referenced where and when relevant.	

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 619237

Contents

1. Introduction

The Ultrafast_RAZipol video has been put together by the Institut fuer Strahlwerkzeuge (IFSW) Universitaet Stuttgart team (USTUTT) using media material provided by each member of the Consortium, in order to give the general public and scientific researchers an insight of the project.

The purpose of this first video is to present the project's aims, objectives and expected results as well as the partners and their individual involvement within the Ultrafast_RAZipol project.

The different sections of the video unroll as follows:

1. Project title and logo
2. Motivation
3. Material processing with ultrafast laser pulses
4. Radial and Azimuthal polarization
5. Concept and goal
6. Single-Crystal fiber amplifier "SCF"
7. Thin-Disk laser concept "TDL"
8. Thin-Disk Multipass amplifier "TDA"
9. Large area structuring
10. Drilling of high aspect ratio holes in metals
11. Broad range of applications
12. Introduction of the partners and their contribution

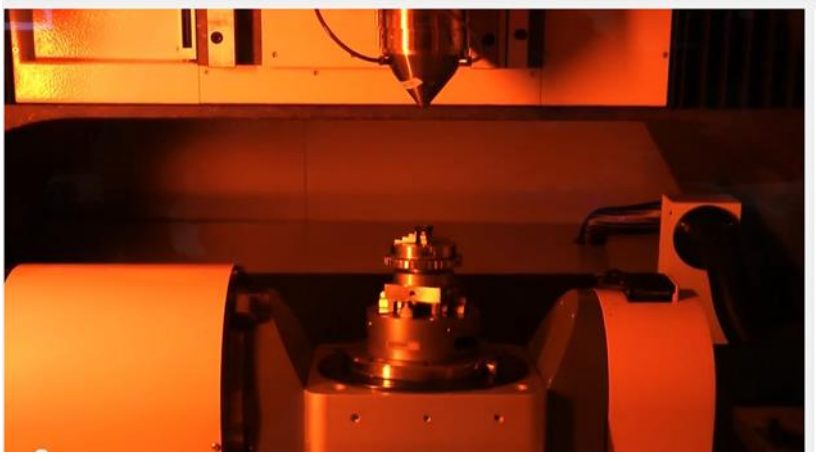
2. Presentation of the Ultrafast_RAZipol video

2.1 Project title and logo

The first shot of the video introduces the Ultrafast_RAZipol project's full title and official brand logo. It also identifies that the project has received funding from the European Community's Seventh Framework Programme under Grant Agreement No 619237.

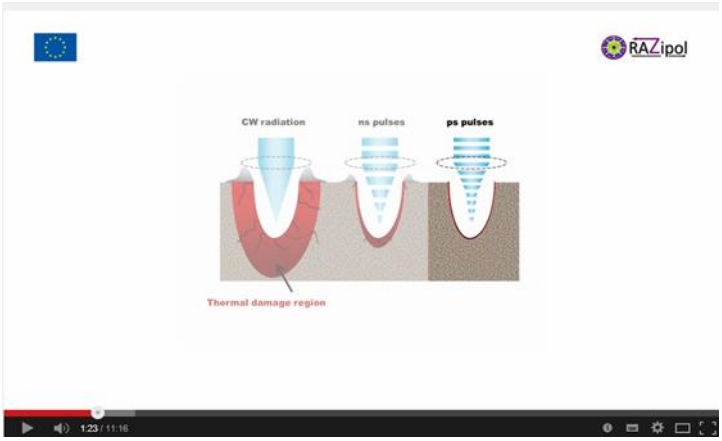
2.2 Motivation

This is followed by a short film sequence introducing the motivation behind the project. The narrator explains that High-precision laser micro-machining is essential to produce some of the key features used in devices like smart phones or tablets. Spinning nozzles used widely in the textile industry are also produced using ultrafast lasers and diesel nozzles produced with ultrafast lasers lead to significantly reduced air pollution. High-volume production requires high processing speeds, which is possible with powerful lasers only.



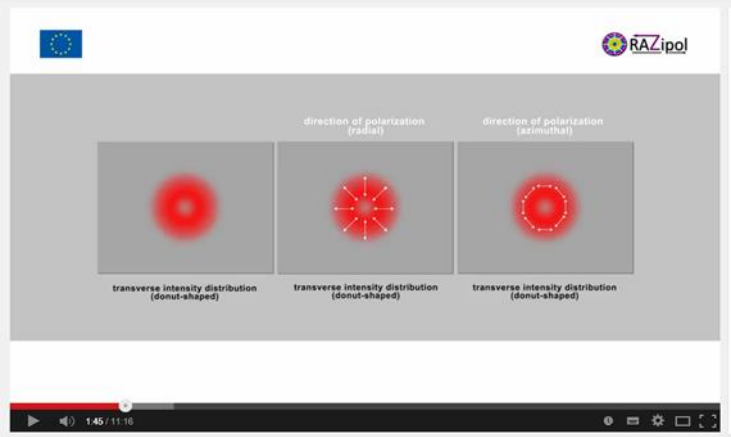
2.3 Material processing with ultrafast laser pulses

An animation schematically demonstrates the thermal effects typically occurring in the workpiece depending on the pulse duration of the laser used. The narrator explains that picosecond pulses are mandatory to fabricate precise structures in metals.



2.4 Radial and Azimuthal polarisation

In this section, the narrator firstly explains what radial and azimuthal polarized laser beams are and how to obtain them. She then ends by stating the advantages these beams have such as allowing constant material processing results independent of the direction of the feed motion.

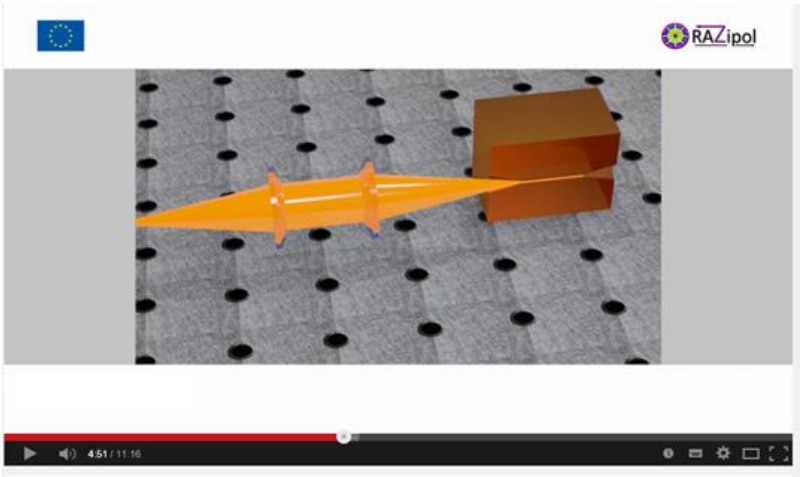


2.5 Concept and goal

Here the narrator gives an overview of the project, highlighting the overall goal, the key technologies used for the new laser concept and an insight as to how this will be achieved.

2.6 Single-Crystal fiber amplifier "SCF"

A computer animation schematises the single-crystal fiber amplifier principle and how this is used to minimise the stress applied to the fiber and thus reducing the depolarization losses.

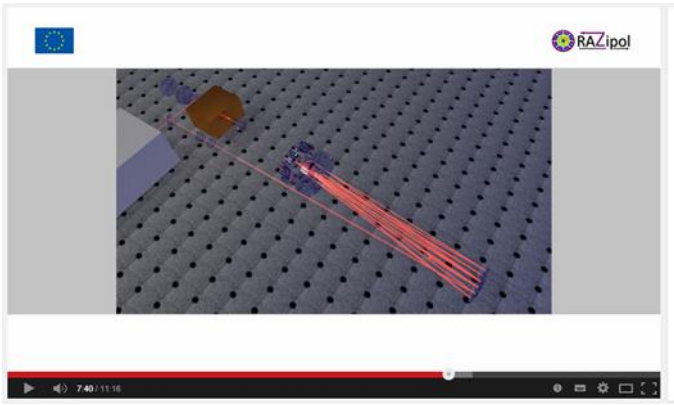


2.7 Thin disk laser concept "TDL"

Another computer animation schematises the thin disk laser principle and how it enables to scale the output power in fundamental-mode operation into the kilowatt range.

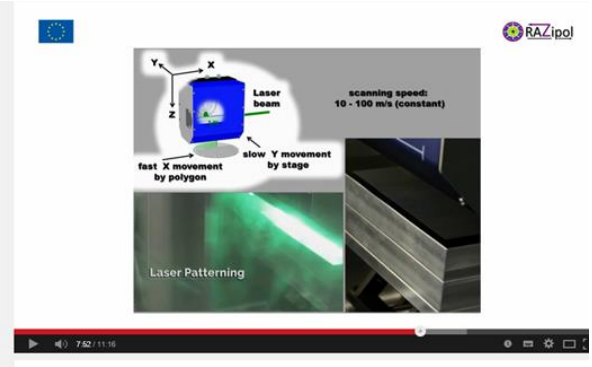
2.8 Thin-Disk Multipass Amplifier "TDA"

In this section, the narrator explains step by step, the thin-disk multipass amplifier concept, which is employed to achieve the targeted high pulse energies and average powers required.



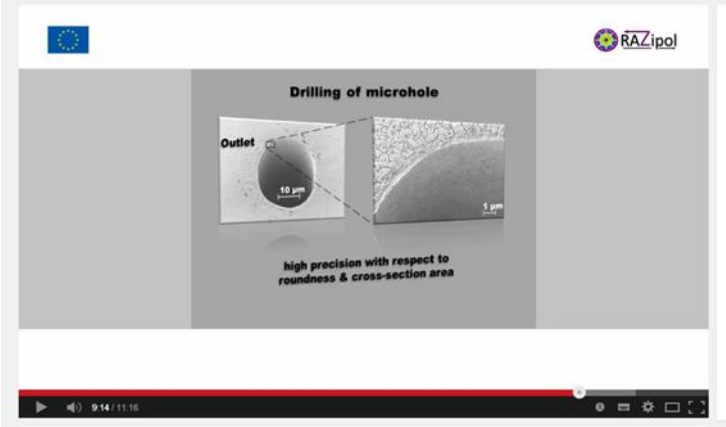
2.9 Large area structuring

The following section introduces the polygon scanner concept developed within the project. The narrator explains that one of the focuses for the Ultrafast_RAZipol project will be to fabricate complex analytic systems integrated on a single silicon wafer, which would lead to promising high-volume application potential.



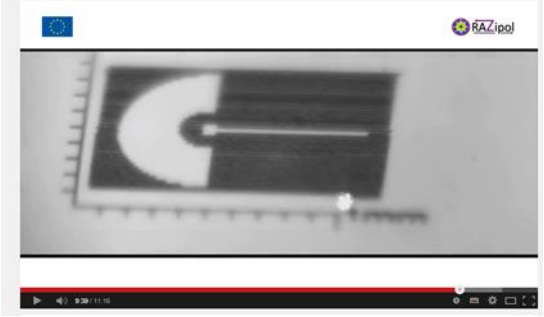
2.10 Drilling of high aspect ratio holes

This section informs the viewer that the low repetition rate picosecond laser system will focus on the drilling of high aspect ratio holes and that thanks to the cylindrically polarized pulses the drilling speed and precision shall be improve.



2.11 Broad range of applications

This section highlights the targeted benefits of the project for potential end users by stating that, employing the high-speed processing of metals based on the high-average power picosecond laser systems developed within this project will lead to significant improvements in a broad range of applications, including the precise and cost efficient production of spinnerets.



2.12 Introduction of the partners and their contribution

This final section is used to present each one of the partners involved and how they contribute to the project's objectives.

3 Video accessibility

3.5 YouTube

The Video is accessible to the general public via YouTube using the following link: https://youtu.be/UMa-TZZBdtk