innovaTECH
INNOVATIVE SOLUTIONS FOR MATERIALS ANALYSIS
INNOVATECH LABS, LLC
13805 1st Ave. N, Suite 100
Plymouth, MN 55441
PHONE
763-231-0150
FAX
763-231-0151
EMAIL
info@innovatechlabs.com
WEBSITE
www.innovatechlabs.com

# LABORATORY REPORT

**PREPARED FOR:**

Mike Christensen
Fire Cut Diamonds
5851 West Charleston Boulevard
Las Vegas, NV 89146

Report Date: November 15, 2010
Date Submitted: November 10, 2010
Project Number: FCD 110866
Purchase Order: American Express

**PROJECT TITLE: Evaluation of a gemstone.**

## INTRODUCTION

A gemstone was submitted for material characterization using Scanning Electron Microscopy with Energy Dispersive x-ray Spectroscopy (SEM/EDS) and Electron Spectroscopy for Chemical Analysis (ESCA). The gemstone was identified as Diamond Nexus Labs, Case #FCD016753, Evidence #20100229.

## SUMMARY AND CONCLUSIONS

SEM:

EDS analysis for the gemstone detected mainly zirconium, oxygen and yttrium, with some hafnium, and carbon. The sample was analyzed at 5kV, 10kv and 20kV accelerating voltages for the electron beam. Using lower accelerating voltages limits the beam penetration into the sample resulting in a greater proportion of data being collected from the near surface. Using the lower accelerating voltages is thus useful when investigating for the presence of a thin coating. For this sample, the same elements were detected at all 3 accelerating voltages used. Thus, no coating was detected by EDS analysis. If a very thin coating is present, it may be detectable by a surface analysis technique such electron spectroscopy for chemical analysis (ESCA.

ESCA:

The ESCA data show the presence of carbon, oxygen, zirconium, and yttrium. No evidence of a corundum ($Al_2O_3$) coating was detected. If aluminum were present, it should show two peaks at ca. 75 eV and 115 eV. The sampling depth for the ESCA technique is ca. 50 Angstroms.

## TEST PROCEDURES

SEM:

The gemstone was examined by SEM/EDS. Qualitative chemical analyses were obtained using EDS and accelerating voltages of 5 kV, 10 kV, and 20 kV.

ESCA:

The ESCA data were acquired using a monochromatic Al Kα x-ray source, a take-off angle of 65º and an analyzed area having a diameter of ca. 1 mm. A low energy resolution survey scans was obtained from the facet of the gemstone to determine what elements were present. .

**RESULTS**

SEM:

The EDS spectra at accelerating voltages of 5 kV, 10 kV, and 20 kV are shown in Figure 1 below.

ESCA:

The ESCA survey scan is shown in Figure 2 below.

**SAMPLE DISPOSITION AND DATA STORAGE**

The sample from this project will be stored for at least 3 months from the date of this report. The sample may then be discarded unless instructions for return or other disposition are received. All data will be kept on file for 3 years. Additional report copies can be obtained upon request.

Submitted by:

Gary A. Smith
President and Owner

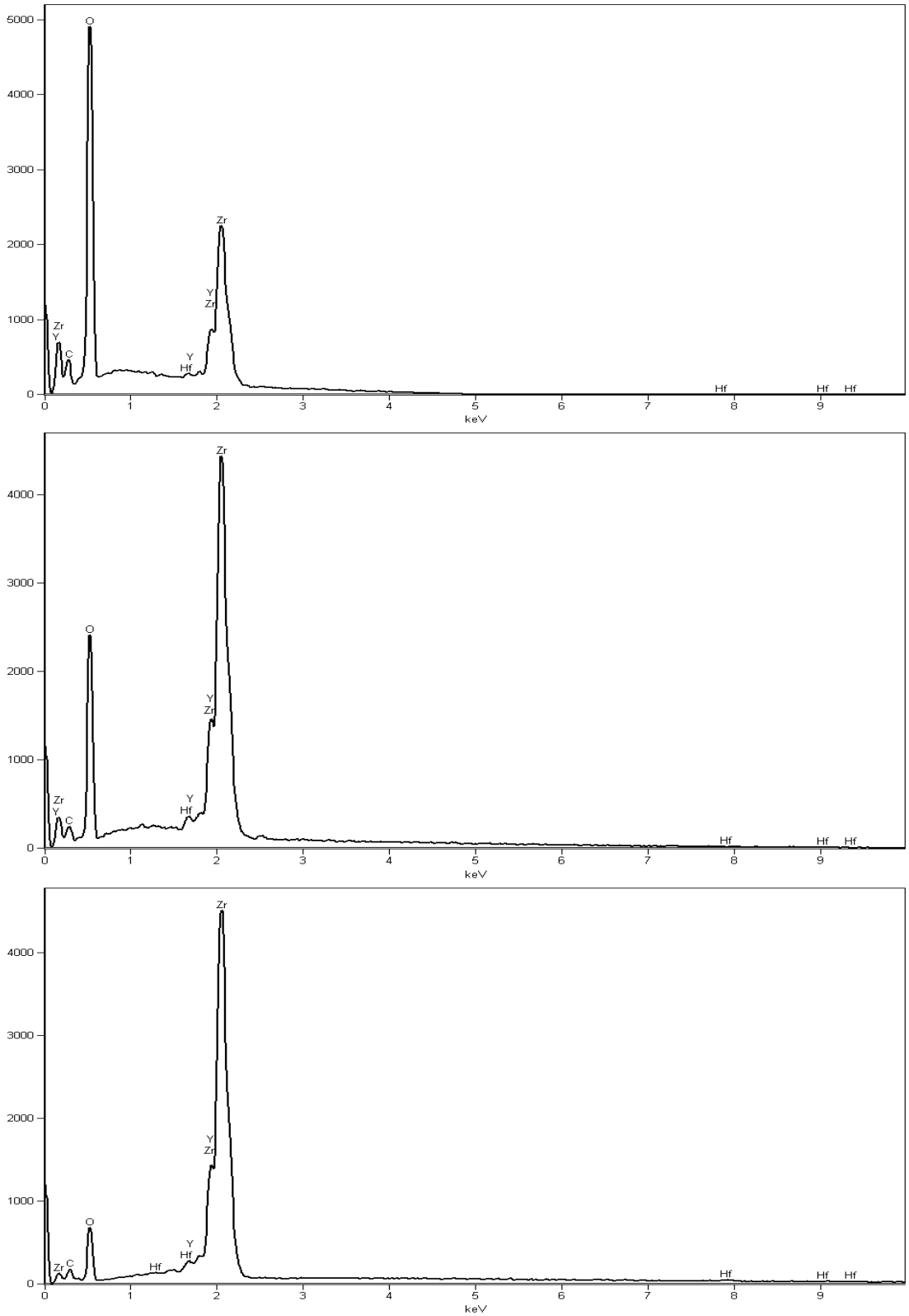


Figure 1. EDS spectra of gemstone at an accelerating voltage of 5 kV (top), 10 kV (middle), and 20 kV (bottom).

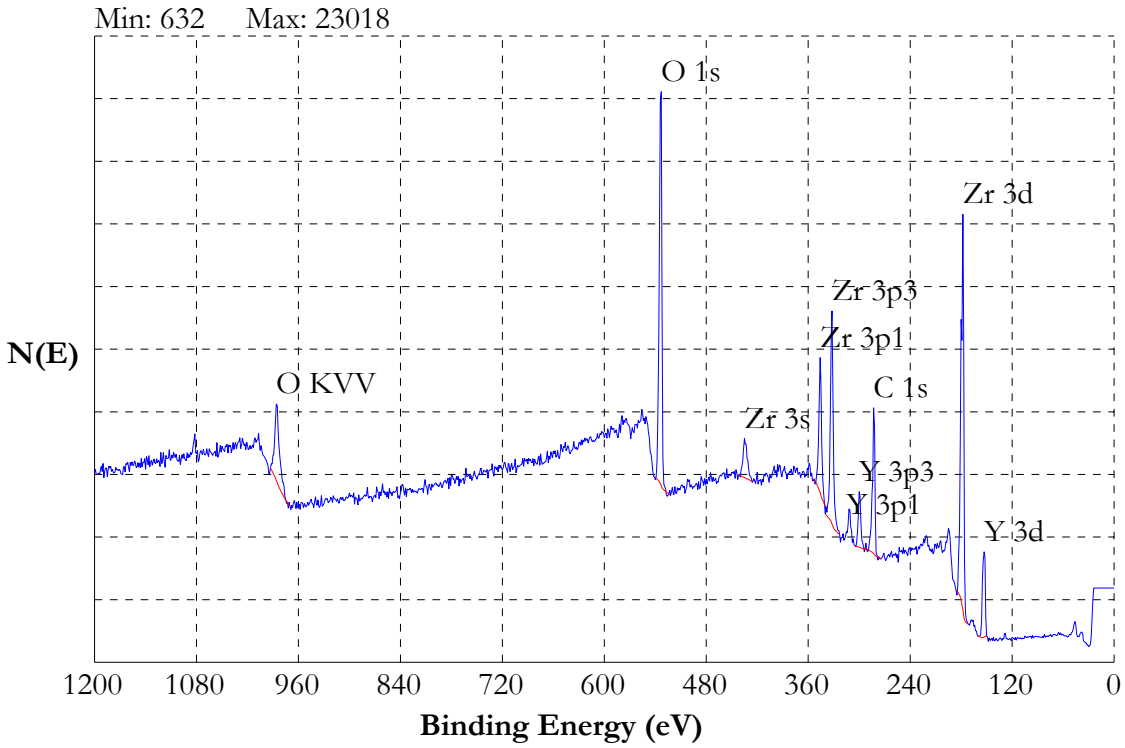


Figure 2. ESCA survey scan of gemstone.