CONTRACT CRYSTAL GROWTH
AND
FABRICATION SERVICES

Quarterly Technical Report # 7

Period: November 1990 through January 1991

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Contributors: J. E. Creamer, R. C. Acklin, M. H. Randles

Prepared by: M. H. Randles
Airtron Division of Litton Systems, Inc.
PO Box 410168
Charlotte, N. C. 28241-0168

Submitted to: Dr. Charles Marquardt, COTR
Naval Research Laboratory
Code 6551
4555 Overlook Ave., SW
Washington, D. C. 20375-5000
SUMMARY

This program is intended to give the scientists at the Naval Research Laboratory the ability to evaluate new solid state laser crystals. During the seventh quarter of this contract one growth run performed, the eleventh since project start.

CRYSTAL GROWTH

The crystal requested and grown was Erbium Scandium Gallium Garnet (ESGG). The melt composition is listed in Table 1. It was assumed that the distribution coefficients are unity and that the crystal composition will be the same as the melt.

<table>
<thead>
<tr>
<th>Growth Run</th>
<th>Melt composition</th>
<th>Nominal Doping</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRL-11</td>
<td>Er$_3$ Sc$_2$ Ga$<em>3$ O$</em>{12}$</td>
<td>none</td>
</tr>
</tbody>
</table>

The growth conditions are listed in Table 2. The crystal grew well. Some strain and surface cracking exists. The best material is in the center of the boule. No fluorescence was observed with a bright fiber optic inspection light or long wave UV source.

<table>
<thead>
<tr>
<th>Growth Run</th>
<th>Pull Rate mm/Hr</th>
<th>Rotation RPM</th>
<th>Oxygen %</th>
<th>Average Diameter mm</th>
<th>Length at Diam mm</th>
<th>Fraction Crystallized</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRL-11</td>
<td>3</td>
<td>45</td>
<td>1.5</td>
<td>29</td>
<td>55</td>
<td>.16</td>
</tr>
</tbody>
</table>

PLAN S FOR NEXT QUARTER

Work in progress includes fabrication and coating of ESGG, Tm:YAG and titanium doped sapphire parts.