#1 CONTACT INFORMATION:

<table>
<thead>
<tr>
<th>Procedure Title</th>
<th>Synthesis Carboranyl Magnetic Nanoparticles (MNPs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure Author</td>
<td>Siddappa Patil</td>
</tr>
<tr>
<td>Date of Creation/Revision</td>
<td>01/24/2014</td>
</tr>
<tr>
<td>Name of Responsible Person</td>
<td>Prof. Narayan Hosmane</td>
</tr>
<tr>
<td>Location of Procedure</td>
<td>Faraday Hall 301 and 304</td>
</tr>
<tr>
<td>Approval Signature</td>
<td>(If required. See section #9 of this template)</td>
</tr>
</tbody>
</table>

#2 THIS STANDARD OPERATING PROCEDURE (SOP) IS FOR A:

- **X Specific laboratory procedure or experiment**
  
  Examples: synthesis of chemiluminescent esters, folate functionalization of polymeric micelles, etc.

- **Generic laboratory procedure that covers several chemicals**
  
  Examples: distillation, chromatography, etc.

- **Generic use of specific chemical or class of chemicals with similar hazards**
  
  Examples: organic azides, mineral acids, etc.

#3 PROCESS OR EXPERIMENT DESCRIPTION

3. Synthesis of carboranyl magnetic nanoparticles
Provide a brief description of your process or experiment, including its purpose. Do not provide a detailed sequential description as this will be covered by section #6 of this template. Indicate the frequency and duration below. [PRECEDING GUIDANCE TEXT MAY BE DELETED.]

| Frequency: | □ one time □ daily □ weekly □ monthly □ other:_____________
| Duration per Expt: | __________ minutes; or __2-4____ hours; |

#4 SAFETY LITERATURE REVIEW & HAZARD SUMMARY

1. **Decaborane** - Flammable solid, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Toxic by skin absorption, Irritant. Personal protective equipment (PPE): Gloves, Goggle and lab coat.
2. **Ethyl acetate** - Highly flammable liquid and vapour, Causes serious eye irritation, May cause drowsiness or dizziness, Personal protective equipment (PPE): Gloves, Goggle and lab coat.

#5 STORAGE REQUIREMENTS

1. **Decaborane** – Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition. Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
2. **Ethyl acetate** - Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition. Keep container tightly closed in a dry and well-ventilated place.

#6 STEP-BY-STEP OPERATING PROCEDURE

[FOLLOWING GUIDANCE TEXT MAY BE DELETED]

**Synthesis of carboranyl magnetic nanoparticles**

1. Magnetic nanoparticles (40 mg) was suspended in dried toluene (20 mL) and then the corresponding triethoxysilane derivatives (80 mg) and decaborane were added.
2. The reaction mixture was heated under reflux for 2 h.
3. Evaporation of the solvent up to half of the volume to remove the formed side products.
4. Followed by further addition of dry toluene (10 mL) and reflux for an additional hour.
5. The reaction mixture was filtered, washed with dichloromethane (50 mL) and dried under vacuum.
6. Clean up work area and lab equipment.
   Rinse all the used glassware first with acetone then washes with soap water and again rinse by acetone and keep in oven for next use.
7. Remove PPE and wash hands.

### Steps to include in your procedure:

1. Don personal protective equipment.
   - ☐ appropriate street clothing (long pants, close-toed shoes)
   - ❌ gloves; indicate type: _Nitrile (Fisherbrand)__________________________
   - ☐ safety goggles   ☐ safety glasses   ☐ face shield
   - ☐ lab coats
   - ☐ other:_________________________

2. Check the location and accessibility of the safety equipment that serves your lab:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Fume Hood/Glove Box or other Ventilation Control</td>
<td>Location: Faraday Hall 301 and 304</td>
</tr>
<tr>
<td>Eyewash/Safety Shower</td>
<td>Location: Faraday Hall 301 and 304</td>
</tr>
</tbody>
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### WASTE DISPOSAL

All experimental waste goes to the organic waste container.

### TRAINING REQUIREMENTS

**General Training** *(check all that apply):*
- ☐ General Safety & Emergency Preparedness
- ☐ Chemical Safety for Laboratories
Depending on the hazardous materials and processes you will be working with in this SOP, additional safety training may be required by NIU. [PRECEDING GUIDANCE TEXT MAY BE DELETED]

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**Laboratory-specific training** *(check all that apply):*
- [ ] Review of SDS for other chemicals involved in process/experiment
- [ ] Review of this SOP
- [ ] Other: ____________________________________

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**#9 PRIOR APPROVALS**

For assistance with this form contact NIU Environmental Health and Safety, 815-753-0404.

Page 4