Standard Operating Procedure

Active copper fuel cell catalysts

*This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and
3) SOP has been signed and dated by the PI and relevant lab personnel.*

 Print a copy and insert into your
*Laboratory Safety Manual* and *Chemical Hygiene Plan*.
Refer to instructions for assistance.

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was written:** | Click here to enter a date. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Internal Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** ☐ Process ☐Hazardous Chemical ☒ Hazardous Class

**Purpose**

Active copper fuel cell catalysts (eg. Cu/ZnO/Al2O3) refer to a family of pyrophoric chemicals that are highly flammable and spontaneously combustible. Handle with care. Proper training is required for handling pyrophoric material. They may ignite and react explosively upon contact with oxygen in air and often with water. Once spilled, all liquid and solid pyrophoric material will instantly ignite. Handle and store under inert gas. Inhalation of the decomposition products may cause severe injury or death. Please refer to the MSDS of the specific chemical for safe handling and other health hazards. It is recommended that the Sigma-Aldrich Technical Bulletins on handling air-sensitive reagents (AL-134) and on handling pyrophoric reagents (AL-164) also be read in combination with this SOP.

**Physical & Chemical Properties/Definition of Chemical Group**

CAS#: Various

Class: **Highly flammable, pyrophoric, water reactive, toxic**

Molecular Formula: Various

Form (physical state): Solid, liquid

Color: Various, metal

Boiling point: Various

**Potential Hazards/Toxicity**

Active copper fuel cell catalysts are pyrophoric chemicals. They are highly flammable and spontaneously combustible. May ignite or react explosively upon contact with water or moist air. Can spontaneously ignite if exposed to oxygen in air. May re-ignite after fire is extinguished. Containers may explode when heated. Fire can produce irritating and toxic gases. Inhalation of decomposition products may cause severe injury or death. They may be harmful if ingested, inhaled, or absorbed through the skin. They may cause irritation to the gastrointestinal tract, respiratory tract, skin, and eyes. Please refer to the SDS of the specific chemical when handling.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

Use a full-face respirator with multi-purpose combination (US) respirator cartridges.

Respirators should be used only under any of the following circumstances:

* As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
* When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
* Regulations require the use of a respirator.
* An employer requires the use of a respirator.
* There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
* As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by ORS and should contact occhealt@uga.edu. This is a UGA requirement described in more detail in the [UGA Respiratory Protection Plan](https://esd.uga.edu/sites/default/files/respiratoryprotection.pdf) and supported by the [Office of Research Occupational Health and Safety Program](https://research.uga.edu/ohsp/).

**Hand Protection**

Handle with gloves. Nitrile gloves are recommended.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with active copper fuel cell catalysts.

Refer to glove selection chart from the links below:

<http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf>

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

**Eye Protection**

ANSI approved, tight-fitting safety glasses/goggles. Face shields are also recommended.

**Skin and Body Protection**

Flame-resistant lab coat preferably made of antistatic material, long pants, and closed-toe shoes.

**Hygiene Measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Engineering Controls**

Active copper fuel cell catalysts in solid form should only be used in a glove box. Active copper fuel cell catalysts in liquid form should be used either in a glove box or in a closed system in a certified chemical fume hood.

**First Aid Procedures**

**If inhaled**

Move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, administer oxygen. Consult a physician.

**In case of skin contact**

Take off contaminated clothing and shoes immediately. Flush skin with water for at least 15 minutes. Consult a physician.

**In case of eye contact**

Flush eyes with plenty of water for at least 15 minutes lifting lower and upper eyelids and removing contact lenses. Consult a physician.

**If swallowed**

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**Special Handling and Storage Requirements**

**Precautions for safe handling:** Avoid inhalation and ingestion. Avoid contact with skin, eyes, and clothing. Provide adequate exhaust ventilation. Use spark-proof tools and explosion-proof equipment. Keep away from sources of ignition - No smoking. Prevent build-up of electrostatic charges.

**Conditions for safe storage:** Keep container tightly sealed in a dry and well-ventilated place. Containers must be kept upright to prevent leakage.Never allow contact with water. Store away from oxidizing agents and air.Handle and store under inert gas.

**Spill and Accident Procedure**

**Chemical Spill Dial 911**

**24-7 On-Call Response to Research, Environment, Health or Safety Concerns Dial 2-5561 from a campus phone or 706-542-5561 from a non-campus line.**

**Spill** – Follow the procedures set out in the [UGA Chemical and Laboratory Safety Manual.](http://research.uga.edu/docs/units/safety/manuals/Chemical-Laboratory-Safety-Manual.pdf)

[If there are any chemical-specific protocols for responding to a spill, insert them here or mark “none”:]

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# **Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends And Holidays** – Dial **911** or the emergency phone numbers listed at the beginning of the UGA Chemical and Laboratory Safety Manual

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Non-Life Threatening Emergency** – Follow the instructions in the UGA Chemical and Laboratory Safety Manual.

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Decontamination/Waste Disposal Procedure**

**For general hazardous waste disposal procedures, see Appendix H of the UGA Chemical and Laboratory Safety Manual.**

**Chemical Specific Procedures: [to be inserted or marked as “none”]**

Wearing proper PPE, cover with dry sand or other non-combustible material. Do not flush with water. Dispose of the used chemical and contaminated disposables as hazardous waste.

**Safety Data Sheet (SDS) Location**

UGA personnel can access Online SDS through a link in the upper left corner of the ESD home page (<https://esd.uga.edu>) and logging in by using their UGA email user name and password.

**Protocol/Procedure (Add lab specific Protocol/Procedure here)**

Click here to enter text.

**NOTE**

Any deviation from this SOP requires approval from PI.

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with active copper fuel cell catalysts, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and access to the SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last 12 months.

**Principal Investigator SOP Approval**

Print name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Approval Date:

I have read and understand the content of this SOP:

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| **Name** | **Signature** | **Date** |
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