To: Name, Title, Company Name

**2 PAGES ONLY! Remove this text box!**

**Remove all red text instructions!**

**Replace green text with your words!**

**Create technical brief paragraph format!**

From: Team 13

Subject: Procedure for band gap energy optimization

Date: February 19, 2015

**I. Introduction/Re-Usability:** Describe the problem and identify the direct user. Describe the direct user’s needs in terms of the deliverable, its function, the criteria for success (indicators of a working solution), and the constraints (what was provided to guide the design solution). Delete this red text.

Our team was asked to develop an optimization algorithm. The direct user is the QD-PV fabrication team. The direct user needs our algorithm that provides a simple way to minimize either the cost and/or the toxicity of the ‘recipe’ for a given goal Quantum Dot (QD) band gap energy. The criteria for success of our optimization algorithm are successful minimization, robustness (accepts variety of inputs/volumes and provides appropriate outputs), and ease of use. The constraints are the attributes of the materials including their cost and toxicity.

Provide an overarching description of what the procedure is designed to do and emphasize its key features. Delete this red text.

The procedure is designed to minimize the cost and/or toxicity of the product. The key features are selection of the best materials to use, adding all materials to meet minimum usage requirements, and creating final ‘recipe.’

State your assumptions about the conditions under which it is appropriate to use your procedure or limits when your model can be used. Delete this red text.

The assumptions are that there are no free materials being use (cost/toxicity must be greater than zero). The limitations of our procedure are the amount of data that can be entered into the function is bounded by the capabilities of the platform used, it can currently only minimize two attributes at once (but is easily expandable), and logical contradictions (the goal being impossible to meet using given materials).

**II. Procedure/Mathematical Model:** List the steps of your procedure. Provide sample calculations and explanations for steps that may be more difficult to understand or replicate. Delete this red text.

The procedural steps to create an ‘optimization attribute’ are:

1. Assign relative importance to each attribute that you wish to minimize (e.g. if toxicity is twice as important as cost, toxicity will be assigned a value of 2 and cost will be assigned 1).

2. Multiply each attribute by its relative importance and then divide by the maximum value of that attribute. Call this the scaled attribute value. (e.g. if cost has a relative importance of 1 and its maximum value is 50, then a cost of 25 would be scaled to 1\* (25 / 50) or 0.5).

3. Sum all the scaled attribute values for each material. (e.g. if a material has a scaled cost of 0.5 and a scaled toxicity of 0.2 its optimization attribute is 0.7).

4. type clear step here and include any assumption associated with step

5. type clear step here and include any assumption associated with step

6. type clear step here and include any assumption associated with step

A sample calculation of this procedure is: provide sample computations for steps that may be more difficult for the direct user to understand or replicate and recognize significant figures

The rationale for our model’s critical steps of xxx are based on this evidence.

Our team has identified the complexity of this problem as what. Our mathematical model addresses the problem’s complexity by how.

**III. Results (Share-ability):** Present results of applying the procedure to the specified data in the form requested. Results should be formatted for technical presentation; they should not be copied from MATLAB or Excel without cleanup. Consider using tables or graphs to present your results more concisely. An example is provided. Delete this red text.

GOAL: (*Eg,quantum dot*)*eff* = 1.33 eV

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material | Material Qty | (*Eg,quantum dot*)*eff* | Min Cost | Min Toxicity |
| QD1 |  |  |  |  |
| QD2 |  |  |  |  |
| QD3 |  |  |  |  |
| QD4 |  |  |  |  |
| QD5 |  |  |  |  |
| Total: | 100 g |  |  |  |

GOAL: (*Eg,quantum dot*)*eff* = 1.65 eV

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material | Material Qty | (*Eg,quantum dot*)*eff* | Min Cost | Min Toxicity |
| QD1 |  |  |  |  |
| QD2 |  |  |  |  |
| QD3 |  |  |  |  |
| QD4 |  |  |  |  |
| QD5 |  |  |  |  |
| Total: | 100 g |  |  |  |

**IV. Other Information:** Provide any other information that has been requested. Delete this red text.

Thank you for the opportunity to what. We hope these procedures help who to what.

Sincerely,

**REMEMBER to write concisely and remove any extraneous information!**

**And remember to remove this text box!**