

Questionnaire Exemption Request No. 2013-2

Exemption for “Cadmium in II-VI LED Downconversion”

Background

The Öko-Institut together with Fraunhofer IZM has been appointed within a framework contract for the evaluation of applications for granting, renewing or revoking an exemption to be included in or deleted from Annexes III and IV of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.¹

QD Vision Inc. has applied for extension of existing exemption No.39.

The existing exemption wording “*cadmium in color converting II-VI LEDs (< 10 µg Cd per mm² of light-emitting area) for use in solid state illumination or display systems*” is proposed to be reformulated through the following wording proposal:

“*Cadmium II-VI color converting material (< 10 µg Cd per mm² of light-emitting area) for LEDs for use in solid state illumination or display systems*“

The applicant further requests the exemption be valid for an additional period of 5 years pursuant to Article 5(2) of Directive 2011/65, as well as the possibility that cadmium may be used in spare parts for EEE placed on the market before the "expiry date".

The applicant makes the following main arguments.

- In light of their narrowband, tunable, stable and efficient properties, the II-VI down-conversion materials (e.g. quantum dots), will provide consumer products with the superior performance, efficiency, and net benefit to the environment. For instance, in lighting, narrowband emission translates to warmer light sources with 20 - 40% greater efficacy. Such products have already been placed on the market in the US.
- According to the applicant the down-conversion materials contain small quantities of cadmium, the net life cycle reductions in energy consumption, carbon emissions, and cadmium waste and emissions are compelling (outlined in applicant’s application). In addition, these new materials will reduce European dependency on several EC recognized critical materials such as yttrium, europium, and indium. The net benefit to the environment is due to the system level increase in efficiency that is achieved

¹ Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

using the II-VI down-conversion materials, due to their narrowband, tunable, and efficient nature

- Today there are no alternative semiconductor materials that can replace the cadmium in II-VI down-conversion materials and retain sufficient performance for remaining practical. Indeed, the search for cadmium-free semiconductor QDs has been ongoing for a decade or more, and the best (but still insufficient) known candidate today is indium phosphide, a III-V semiconductor.

For details, please check the applicant's exemption request at:

<http://rohs.exemptions.oeko.info/index.php?id=182>.

This exemption request has been subject to a first completeness and plausibility check. The applicant has been requested to answer additional questions and to provide additional information (c.f. link above).

The objective of this consultation and the review process is to collect and to evaluate information and evidence according to the criteria listed in Art. 5 (1) (a) of Directive 2011/65/EU (RoHS II), which can be found under:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>.

If you would like to contribute to the stakeholder consultation, please answer the following questions:

Questions

1. The wording suggested by the applicant for an extension of the exemption is proposed to be **“Cadmium II-VI color converting material (< 10 µg Cd per mm² of light-emitting area) for LEDs for use in solid state illumination or display systems“**
 - a. Do you agree with the scope of the exemption as proposed by the applicant? Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording.
 - b. Please state whether you either support the applicant's request or whether you would like to provide argumentation against the applicant's request. In both cases provide detailed technical argumentation / evidence in line with the criteria in Art. 5 (1) (a) to support your statement.
2. The applicant mentions that possible substitutes are OLEDs, RGB LEDs, CFQDs.

- a. Please provide information concerning these possible substitutes or developments that may enable substitution or elimination at present or in the future. If possible please provide data to establish reliability of possible substitutes.
 - b. According to the applicant OLED are the only possible substitute relevant for the near future which could be used in applications similar to those relevant for QD-based LCDs. Please explain in detail, the current status of using OLED in comparison to applications using II-VI semiconductor down-conversion materials.
 - c. Furthermore please explain what display sizes cannot yet be manufactured with OLED? Is it possible to use OLED in the same applications using II-VI semiconductor down-conversion materials (can they replace one another), for instance in the small size displays?
3. The applicant states that today there are no alternative semiconductor materials that can replace the cadmium in II-VI down-conversion materials and retain sufficient performance to be useful.
- a. Do you agree with the statement of non-existing alternatives made by the applicant?
 - b. If not, please provide information about alternative semiconducting materials that can replace the cadmium-containing semiconducting material in the II-VI in LEDs for use in solid state illumination or display systems
4. Please indicate if the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits. If existing, please refer to relevant studies on negative impacts caused by substitution.

In case parts of your contribution are confidential, please clearly mark relevant text excerpts or provide your contribution in two versions (public /confidential).

Finally, please do not forget to provide **your contact details** (Name, Organisation, e-mail and phone number) so that Öko-Institut/Fraunhofer IZM can contact you in case there are questions concerning your contribution.