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Title: Collaborative R&D Opportunity: E-Beam Hard Gold

NAICS code: 54171-Research and Development in the Physical, Engineering and Life Sciences

Classification Code: A-Research and Development

Background Information

Sandia has filed a non-provisional patent application for a physical vapor deposition process related to wear-resistant hard gold coatings for electrical contacts. This process facilitates a wear-resistant, chemically unreactive nanocrystalline coating that is electrically conductive with high thermal stability. The nanocrystalline coating, called "E-Beam Hard Gold" comprises two (or more) codeposited species, wherein nominally pure noble gold is strengthened by reducing its average grain size to below 100nm by incorporating minute quantities of secondary ceramic phase(s). The use of e-beam evaporation increases the range of materials beyond those achievable via traditional electrodeposition routes and also enables the synthesis of codeposited structures using a wide variety of hardener types. The process generates no chemical waste, completely circumventing the need to use or dispose of hazardous and ecologically damaging chemicals associated with traditional electroplating techniques. These coatings are ideally suited for applications requiring any combination of the following properties: (1) wear-resistance, (2) low friction in dry/unlubricated conditions (3) high thermal stability, (4) high chemical stability, and (5) the need for a gold hue in hard coating. The coatings are especially attractive for electrical contact applications (e.g. AC or DC switches, low current communication slip-rings and high current transfer systems). The high purity of these nominally pure nanocrystalline gold (> 95 vol. %) coatings are ideal for decorative applications such as jewelry, owing to their extremely high wear resistance while retaining the hue of pure gold. Additionally, these vapor deposited materials are also an environmentally friendly alternative to traditional electroplated Cd and Cr coatings for anti-galling applications, specifically avoiding the generation of highly toxic hexavalent chromium associated with electroplating processes.

Opportunity Description:

Sandia is seeking a Cooperative Research and Development Agreement (CRADA) with an industrial partner interesting in the joint development and eventual deployment of this superior e-beam process.

Sandia will evaluate responses and select prospective parties with which to engage in further discussions based on the following criteria:

Required:

(1) Demonstrated expertise with thin film synthesis utilizing physical vapor deposition techniques such as sputtering and electron beam evaporation for commercial use
(2) Proven track record of supplying materials and coatings to major electronic industries

Desired:

(1) Experience with in-house R&D on thin film synthesis and characterization
(2) Demonstrated success with SBIR phase 2 or phase 3 projects
(3) Ability to contribute $600K per year for the first two years of the collaborative project, and $300K for a third year

In addition, Sandia will evaluate responses against the following criteria, pursuant to Sandia's technology transfer mission:

(1) What are the respondent's specific research and development, prototyping and deployment capabilities and resources relative to this technology?
(2) How will the respondent deploy the technology for the benefit of the U.S. public good?
(3) How will the respondent's deployment of the technology benefit U.S. economic competitiveness?

In consideration of the above, Sandia invites interested parties to provide a detailed description of relevant background, experience, expertise, and capabilities that could be brought into a collaborative partnership. Interested parties that meet the criteria outlined above are invited to respond. Responses should be emailed to Sandia's CRADA Team at CRADA@sandia.gov .

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