OMB Control No. # 0693-0033 – NIST Generic Clearance for Program Evaluation Data Collections

NIST Materials Genome Initiative Strategic Planning Study: Economic Analysis of National Needs for Technology Infrastructure to Support the Materials Genome Initiative

FOUR STANDARD SURVEY QUESTIONS

1. Explain who will be surveyed and why the group is appropriate to survey.

The purpose of this information collection is to acquire information from manufacturers that will allow the National Institute of Standards and Technology (NIST) to evaluate its strategic options and programs for investing in research and support activities that will best support manufacturers as greater numbers of them adopt advanced approaches to materials innovation as envisioned by the Materials Genome Initiative.

The collection will acquire information and perspectives from firms that develop and apply advanced materials, including biomaterials, catalysts, polymers and polymer composites, correlated materials, electronic and photonic materials, energy storage systems, lightweight structural materials, and organic electronic materials. The emergence of new products and processes in these advanced materials classes is driving emerging needs for technology infrastructure; the information that is required to assist NIST in evaluating its standards and measurement programs and options to meet these needs has never been collected before. The information collection is being launched in direct response to requests from industry (including potential interviewees) and government for NIST to enhance its programs.

Collecting information will allow NIST to evaluate its programs and launch activities that will directly benefit interviewees. Thus, we expect that interviewees will be interested and see benefit to themselves of participating in our information collection.

2. Explain how the survey was developed including consultation with interested parties, pre-testing, and responses to suggestions for improvement.

The instrument is closely based on the four instruments recently developed and successfully implemented for a similar NIST study of different industry needs, in four areas of advanced manufacturing different from the present focus on advanced materials. Similarities in the nature of the information to be collected allowed us to leverage these previous collections to make appropriate decisions regarding modes of collection, word choice, length, and avoidance of redundancy among questions.

The interview guides were developed following early, unstructured discussions with potential interviewees; a review of the scientific, engineering, and industry literature related to the topics;

consultations with industry associations and independent technical experts; and in-depth consultation between NIST technical experts and the contractors leading the data collection on NIST's behalf.

3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.

Interviews facilitated by semistructured interview guides were recommended as the mode for data collection by potential interviewees, who felt that many of the questions included on the instruments are better suited to open-ended response than to choosing from predefined answer selections. Therefore, the instruments will be implemented using interview-based primary data collection over the telephone or in-person at conferences, meetings, and gatherings of professionals and researchers engaged in the technical areas of interest. Interview guides will be shared with respondents in advance, allowing them the opportunity to review the questions and burden estimate, and choose whether to participate in the information collection.

The development and application of advanced materials cuts across standard industry classifications. Therefore, rather than sampling using lists of firms by NAICS codes, we are sampling using lists of firms that belong to or participate in industry associations, consortia, professional associations, and other cross-industry thematic groups.

The groups from which our sample will be drawn include:

- Attendees of MS&T16 (the Materials Science and Technology Conference)
- Attendees of TMS2017 (The Minerals, Metals, and Materials Society Conference)
- Members of ACerS (the American Ceramic Society)
- Members of AIST (Association for Iron and Steel Technology)
- Members of ASM International (the Materials Information Society)
- Members of the Minerals, Metals, and Materials Society

We will invite 200 firms to participate in the information collection. Invitees will be invited by email. The email invitation will include a synopsis of the study and a copy of the interview guide. Because of the timeliness of the topic and the opportunity to participate in an evaluation of NIST's programmatic options, we anticipate that 50% will accept our invitation. We will issue one request to participate and one reminder.

Participating firms will receive copies of the analysis and all reports when they are approved for public release by the NIST Economic Analysis Office. These reports will provide an analysis of industry needs and trends that will be useful to participants.

4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.

For the purposes of this prospective evaluation, NIST does not require statistically significant

results. Rather, it requires an overall evaluation of trends, needs, and prospective impact.

The information collected will be analyzed using Nvivo, Stata, and Excel software tools. These tools permit efficient thematic analysis that will allow NIST to evaluate overall trends and needs. The tools will also allow us to export data to an economic model that will allow NIST to understand how its programs could mitigate market failures impeding materials innovation and quantify the consequent prospective economic benefit. The results will be generalized to the overall population using the research and development (R&D) expenditure and employment, and overall sales revenue and employment data summed for industry segments to which interviewees' firms belong, applying an applicability factor based on interviewees' perceptions of the fraction of R&D activity (at their firm and in their industry segment) related to the development and application of advanced materials.