# NIST TECHNICAL WORKSHOP ON

# BODY ARMOR AND BALLISTIC FIBER RESEARCH

October 3-5, 2007

Cosponsored by

Office of Law Enforcement Standards
Electronics and Electrical Engineering Laboratory

Materials Science and Engineering Laboratory

Building and Fire Research Laboratory

## MISSION

To provide an **international** forum for presenting and discussing the latest scientific and technical advances leading to more reliable and quantitative methods for measurement of the properties of body armor and ballistic fibers.

## OBJECTIVES

- ◊ To critically examine the existing methodology and alternatives to the existing methodology used in assessing the ballistic performance of materials.
- ◊ To present advances in accelerated and field exposure testing protocols leading to quantitative results that are both repeatable and reproducible.
- ◊ To introduce advanced characterization methods including models, advanced methodologies, data collection and data storage formats, having a strong scientific basis.
- ◊ To discuss strategies for implementing these advances.
- ◊ To identify outstanding scientific issues that need to be addressed.

**WEDNESDAY, OCTOBER 3, 2007**
**Building 101**
**Registration and Refreshments**

**8:30 to 9:00 am**

## WEDNESDAY, OCTOBER 3, 2007

### Current Issues in Ballistic Testing

**Kirk Rice, Chair, National Institute of Standards and Technology**

**9:00 - 9:15 a.m.** **Welcome and Introductory Remarks**
Kirk Rice, National Institute of Standards and Technology

**9:15 - 9:45 a.m.** ***Challenges in the Development of Repeatable Ballistic Limit Test Methods for Body Armor***
Michael Riley, National Institute of Standards and Technology

**9:45 - 10:15 a.m.** ***Effect of Statistical Variability and Safety Margin on the Ballistic Test***
Minshon Chiou, DuPont

**10:15 - 10:30 a.m.** **Break**

**10:30 - 11:00 a.m.** ***The Effect of Layer Stacking Order on the V-50 Velocity of Hybrid Fabric Armor Systems***
Leigh Phoenix, Cornell University

**11:00 - 12:30 p.m.** ***Discussion of morning talks– all participants***

**12:30 p.m.** **Lunch** (on your own in the NIST cafeteria)

**1:30 - 2:00 p.m.** ***From Shooting Experiments to Ballistic Performance***
Aad Schaap, Teijin Aramid B.V.

**2:00 - 2:30 p.m.** ***The New Body Armor Test Standards for United Kingdom Police***
John Croft, Home Office Scientific Development Branch

**2:30 - 3:30 p.m.** ***Discussion of afternoon talks– all participants***

**3:30 - 3:45 p.m.** **Break**

**3:45- 4:15 p.m.** ***Laboratory Tour: SPHERE Laboratory***
Joannie Chin, National Institute of Standards and Technology

**4:15 - 5:00 p.m.** ***Laboratory Tour: Ballistic Fiber Characterization Laboratory***
Gale Holmes, National Institute of Standards and Technology

**5:00 p.m.** **Adjourn**

## THURSDAY, OCTOBER 4, 2007

### Challenges in Artificial Aging and Characterization of Ballistic Fibers

**Chad Snyder, Chair, National Institute of Standards and Technology**

**9:00 - 9:15 a.m.** **Welcome and Introductory Remarks**
Kirk Rice, National Institute of Standards and Technology

**9:15 - 9:45 a.m.** ***Durability Issues in Ballistic Fibers***
Joannie Chin, National Institute of Standards and Technology

**9:45 - 10:15 a.m.** ***Non-ballistic Testing of Unidirectional Materials***
Lori Wagner & David Hurst, Honeywell

**10:15 - 10:30 a.m.** **Break**

**10:30 - 11:00 a.m.** ***Test Methods for Monitoring the In-Use Properties of Ballistic Fibers***
Gale Holmes, National Institute of Standards and Technology

**11:00 - 12:00 p.m.** ***Discussion of morning talks– all participants***

**12:00 p.m.** **Lunch** (on your own in the NIST cafeteria)

**1:00 - 1:30 p.m.** ***Accelerated Aging Performance of Dyneema® Yarn and Unidirectional Composites for Ballistic Applications***
Shitij Chabba, DSM Dyneema

**1:30 - 2:00 p.m.** ***Challenges in Development of Environmental Conditioning Protocols for Soft Body Armor***
Amanda Forster, National Institute of Standards and Technology

**2:00 - 2:30 p.m.** ***Effect of Temp/Humidity/Tumbling Conditions on the Ballistic Fiber Properties***
Minshon Chiou, DuPont

**2:30 - 3:30 p.m.** ***Discussion of morning talks– all participants***

**3:30 - 3:45 p.m.** **Break**

**3:45 - 5:00 p.m.** ***Laboratory Tour and Demonstration: OLES Ballistic Testing Laboratory***
Kirk Rice, Michael Riley, Amanda Forster, National Institute of Standards and Technology

**5:00 p.m.** **Adjourn**

## FRIDAY, OCTOBER 5, 2007

### Implementation

**Kirk Rice, Chair, National Institute of Standards and Technology**

**9:00 - 9:15 a.m.** Introductory Remarks

**9:15 - 10:15 a.m.** Discussion of Research and Measurement Needs

**10:15 - 10:30 a.m.** **Break**

**10:30 - 11:45 a.m.** Continued Discussion

**11:45 - 12:00 p.m.** Closing remarks and wrap up

**12:00 pm** **Adjourn**

**All participants are invited to an informal barbeque at the home of co-organizer Gale Holmes on Friday afternoon.**

**Details and directions to be provided at the conference.**


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