

Preface

The field of nanotribology has advanced to a great extent thanks to the phenomenal growth of information storage industry. The magnetic hard disks used for recording and retrieving digital data require extremely thin nanolubricant for the protection of the disk from mechanical damages and wear by the slider which flies just above the surface of the disk with flying height only a few nanometer. Even though the slider is designed not to touch the disk, contacts between the slider and the disk are inevitable and hence we require the protection of the disk by the nanolubricant. A similar requirement, at least in length scale, is experienced in microsystems such as micro-electro-mechanical systems (MEMS) where micron-sized components, usually made of Si, are made to move about just like their macro-machine counterparts. Sliding, contact and impact between the components lead to the problems of adhesion, friction and wear. Because of the small length scales involved, the problems of tribology faced in microsystems differ drastically from those of the traditional macro-scale machines. Therefore, it is important to address these issues taking into considerations the materials, micro-fabrication process, lubricants and the lubrication methods.

A symposium titled “Nano-tribology and Related Materials Issues in MEMS” was organized by the Department of Mechanical Engineering, National University of Singapore from 13 to 14 May 2010. A number of invited talks were presented covering the fundamental nanotribology concepts, applications of new materials, surface modifications of Si and polymer substrates and simulations of the friction phenomenon under light load conditions. This book is a collection of the papers that were submitted by the presenters with some additional contributions by the experts in this field. Each chapter has been carefully selected and edited to bring out current practices in the MEMS tribology field with the explicit aim of finding appropriate solutions to the tribological problems faced in MEMS and nano-scale machines.

The editors would like to express their deepest appreciations to the invited and poster presenters of this symposium without whose help this event would not have been a reality. We thank the Dean, Faculty of Engineering and the Head of the Department of Mechanical Engineering, NUS, who provided all the supports needed for the organization of this event. We are also grateful to the Singapore

National Research Foundation (NRF) for the generous research grant (Award no.: NRF-CRP 2-2007-04) to our team which helped to support much of the research works that were presented in this symposium. Finally, we would like to thank the publisher and the authors of the chapters whose relentless effort through the manuscript preparation and editing has resulted in this compilation of very relevant works in the field of nanotribology and materials for MEMS. We earnestly hope that this edited book will positively add to the expanding literature in this field to help in current and future research.

April 2013

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Nano-tribology and Materials in MEMS

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2013, VIII, 275 p. 157 illus., 89 illus. in color., Hardcover

ISBN: 978-3-642-36934-6