

Preface

Emergent materials and technologies originated by scientific and technological advances have been providing new means to extend textiles' conventional qualities. Smart materials are able to sense and react reversibly to an external stimulus and when integrated in textiles, embed them with intrinsic dynamic and interactive behavior.

Smart textiles have been creating great interest for research and development of innovation-driven applications. They enable the development of new and enhanced functionalities, expressions and performances, namely through the potential to interact with our environment, creating relationships between physical and immaterial dimensions.

Design and development of smart textiles encompass competences in diverse domains and entail new perspectives and challenges for design research and practice, given the novelty that reactive and adaptive qualities introduce.

This book provides interdisciplinary and articulated coverage on smart textiles topics and discusses original research developed on the integration of smart materials in textile substrates and textile design. The design concept subjacent to the research hinges on the interaction of textiles and light. With natural light, man has a long history of using textiles to change light intensity and tone of sunlight, using for example awnings, curtains, clothing and accessories. With artificial light, we commonly act upon the light source: switching on and off different lamps and using dimmers or other technologies to change lighting parameters.

Focused on our experience working with natural light and textiles, the research discussed in this book aimed to study and develop smart textiles that can change the incident light that passes through them—light transmittance—without acting upon the light source, thus creating Dynamic Light Filters.

The research conducted was based on knowledge and experimental practices of textile engineering and design, comprising of two approaches: (a) a materials research focused on integration processes of color change, shape memory and

conductive materials in textile substrates; (b) a design research that studied dynamic qualities of textile color and shape behavior in interaction with light.

After an introduction to Smart Textiles and Dynamic Light Filters themes, this book examines fundamental concepts and knowledge in each smart material domain and respective materials research. Part I looks into dynamic color in textiles through Color Change Materials, Thermochromic textiles, their thermo-responsive behavior and respective electrical activation. Part II focuses on dynamic form through Shape Memory Alloys and textile morphological performances based on origami techniques. Part III presents practice-based design research that explores dynamic qualities of color and shape thermo-responsive textiles and their interaction with light. The research program comprises of two main experimental studies on textile behavior and dynamic light, followed by the development and discussion of three research prototypes that proposed to explore expressive possibilities of color, shape and light performances through different intensity levels of change.

This book will be of interest to academicians, researchers and practitioners inspired by smart materials and textile dynamic and interactive behavior. Application fields include engineering, design, architecture and arts. Sections that comprise of experimental work conducted on integration processes of smart materials in textile substrates are also of value to the textile industry.

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