Functional Condensation Polymers. By C. E. Carraher Jr.,
G G Swift. Kluwer: New York, 2002; hardback, $145,

Based on their structure and composition, polymers can be
divided into condensation polymers and addition polymers. Traditionally, condensation polymers are classified as those
that are obtained by reacting two different functional
groups, which usually originate from different monomers.
Often, the condensation reaction is accompanied by the eli-
mination of a small molecule. Addition polymers are defi-
ned as polymers that are obtained from monomers without
the loss of a small molecule. The repeating unit of an addi-
tion polymer has the same composition as the monomer.

On a bulk basis, addition polymers surpass condensation
polymers two to three times. Also, much of the industrial
and academic research has focussed on addition polymers,
in particular since the development of various ‘living’ and
‘controlled’ polymerisation techniques, which have enabled
the preparation of polymers with predictable molecular
weights and controlled architecture. Most natural polymers,
in contrast, can be classified as condensation polymers. The
objective of the book is to illustrate the breadth and versa-
tility of condensation polymers as functional materials. The
book concentrates on four areas, viz. nanomaterials, light
and energy, bioactivity and biomaterials and enhanced phy-
sical properties. Many of the contributions are based on
papers presented at a symposium organized by the editors at
the 221st ACS National Meeting, which was held from April
1-5, 2001 in San Diego, California (USA).

The first part focuses on nanomaterials and contains four
contributions that discuss the synthesis and properties of
organic-inorganic composites. The other two chapters
describe the preparation and characterisation of novel cross-
linkable polyesters for applications in non-linear optics and
discuss the immune response to polyamidoamine (PAMAM)
dendrimers. In this last contribution, it is shown how conju-
gation of helper T-cell epitopes to PAMAM dendrimers can
be used to generate anti-dendrimer antibodies, which are not
only highly interesting for therapeutic purposes but also for
manipulation and processing of dendritic macromolecules.
The contributions in the second cluster, light and energy,
concentrate on the use of condensation polymers as mem-
brane materials for fuel cell applications and describe the
design and synthesis of materials for the development of
polymeric light-emitting diodes. Two of the chapters report
on condensation polymers that exhibit blue electrolumines-
cence.

Part 3 of the book comprises five chapters that discuss the
bioactivity of condensation polymers and explore possible
(bio)medical applications. This part starts with a brief
review of the different types of natural condensation poly-
mers. In a subsequent chapter, hydrogels are described that
are obtained by photocrosslinking of mixtures of itaconic
anhydride modified poly(caprolactone) or poly(ethylene
glycol). The properties of the gels could be manipulated by
variations in the molecular weight of the macromonomers
and by changing the relative amounts of the hydrophilic and
hydrophobic components. The remaining three chapters
report on organometallic condensation polymers and their
potential as anti-cancer drugs or as controlled release agents
for agricultural applications.

In Part 4, three different strategies to modify and enhance
physical properties are presented. In two chapters, it is
demonstrated how the incorporation of polycyclic aromatic
hydrocarbon moieties can be used to improve thermal stabili-
ity and/or enhance glass transition temperatures and mel-
ting points. Another chapter describes the synthesis of
amorphous polyesters that contain ionic end-groups. These
end-groups can induce ionic association, which influences
both bulk rheological properties as well as solution viscosi-
ties. The final chapter of the book illustrates how optimisa-
tion of processing conditions can be used to obtain poly(p-
phenylene pymellitimide) films of reduced brittleness. The
chapter reports a new processing method that involves
biaxial gel-drawing of a poly(isoimide) precursor.

Unfortunately, the technical quality of the contributions pre-
sented in the book varies considerably, with a number of
chapters certainly being unacceptable for publication in
peer-reviewed scientific journals. Nevertheless, the editors
have succeeded in compiling a number of interesting contribu-
tions that illustrate the potential and versatility of conden-
sation polymers in four areas that are currently active fields
of research.

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