TET 10733

Pergamon

TETRAHEDRON

Tetrahedron 00 (2002) 000–000

Preface

The Tetrahedron chair in organic synthesis 2002

It need not be pointed out that Lewis acid-promoted carbon–carbon bond formation reaction is one of the most important processes in modern organic synthesis. Classically, Friedel–Crafts reaction, ene reaction, Diels–Alder reaction, and Mukaiyama aldol synthesis are catalyzed with ordinary Lewis acids such as $AlCl_3$, $TiCl_4$, $BF_3{\cdot}OEt_2$, or $SnCl_4$. These classical Lewis acids activate the functional groups of substrates, and the reactions proceed in relatively low stereo-, regio-, or chemo-selectivities. On coordination with a well-designed ligand(s), a Lewis acid exhibits substantially new reactivity. Furthermore, designer Lewis acid leads to an isolation of monomeric Lewis acid species whose structural features can be easily understood and extended to selective new designer chiral catalysts for asymmetric syntheses. Thus, metal ligand tunings are the most essential component in the design of Lewis acid reagents.

During the last decade the uninterrupted expansion of this field has continued. New Lewis acid research is targeting more versatile, more selective, and more reactive catalysts. Each research direction synergistically helps and influences all others. The full potential of Lewis acid catalysts, however, is not yet realized. Today it is nearly impossible to read a single issue of a journal devoted to organic chemistry without finding that a new Lewis acid has been developed as an essential tool for synthetic transformations (Fig. 1).

Green chemistry, atom and energy economy, as well as environmentally benign chemical processes are also very important area of chemistry in our century. In fact, activity in this area has grown by leaps and bounds in the past few years, as clearly shown below. It is noteworthy that many of

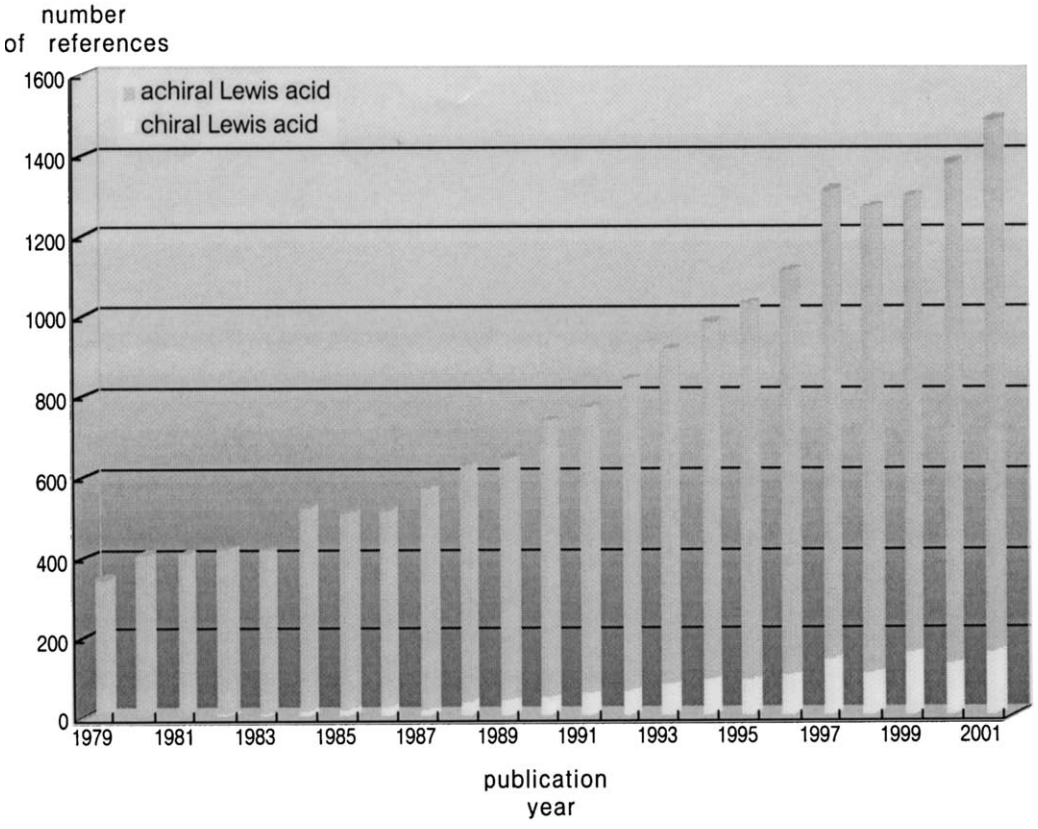

Figure 1. The data obtained by SciFinder Scholar2001, using phrase 'Lewis acid and chiral Lewis acid'.

PII: S0040-4020(02)00964-X

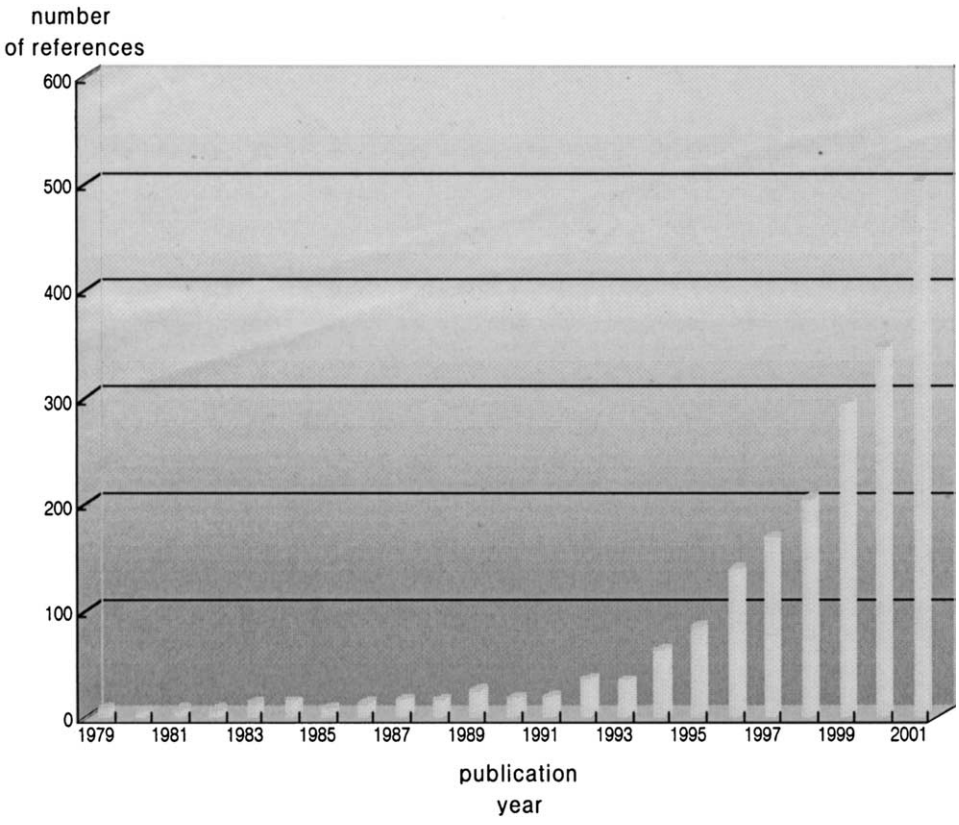

Figure 2. The data obtained by SciFinder Scholar2001, using the phrase 'green chemistry, atom economy, environmentally benign'.

these reports are related to Lewis acid catalysis and two areas are overlapped substantially: this is the major reason why we decided to the present topics: Molecular Design of Lewis and Brønstead Acid Catalysts—Key to Environmentally Benign Reagents (Fig. 2).

With the fruitful gains disclosed by this collection of articles and those reported previously, the vast potential for molecular design of Lewis and Brønstead acid seems clear, and hence it should not be surprising if research on acid catalysts for environmentally benign reagents undergoes extensive development over the next few years.

Hisashi Yamamoto
Department of Organic Chemistry,
University of Chicago,
5735 S Ellis Avenue,
Chicago, IL 60637, USA
E-mail address: yamamoto@uchicago.edu