

Antibody catalysed formation of a 14-membered ring lactoneM.D. Pungente *et al.**Can. J. Chem.*, 2002, **80**, 1643–1645.

A monoclonal IgM antibody raised against the macrocyclic transition-state analogue is shown to catalyse an intramolecular *trans*-esterification reaction to form a 14-membered ring lactone, with K_m of 255 μM and K_{cat} of 0.01/min. Inhibition kinetics suggest that the catalytic binding site overlaps with the antibody-combining site.

Easy method to adjust the angle of the carbon nanotube probe of an atomic force microscopeY. C. Chang *et al.**Appl. Phys. Lett.*, 2003, **82**, 3541–3543.

Carbon nanotubes find applications in imaging surface structures, especially as tips of an atomic force microscope (AFM). A simple and reliable method is described to bend the probe of an AFM to vertically align with the sample. These probes also show self-tuning character.

Designing intelligent fluids for controlling spray applications

Vance Bergeron

C. R. Physique, 2003, **4**, 211–219.

'Complex fluids' are required in the agricultural industry to cater to the needs of environmental protection. Examples of spraying of herbicides and pesticides are cited that perform better during the treatment of plants, by improving spray characteristics, droplet deposition and product retention. This calls for a delicate balance of hydrodynamics and molecular interactions in the polymer solution sprayed.

A molecular PIP2 binding site as a determinant of capsaicin receptor sensitivity

E.D. Prescott and D. Julius

Science, 2003, **300**, 1284–1288.

The capsaicin receptor (TRPV1) can be activated by the pungent vanilloid compound capsaicin, protons and heat. The receptor is also part of the family of phospholipase C coupled receptors and is sensitized by hydrolysis of phosphatidylinositol-4,5-bisphosphate (PIP2). Mutational, domain swap and chimeric experiments show that the PIP2-interaction

domain serves as a critical determinant in tuning TRPV1 and subsequently, sensory neurons.

Nanostructured artificial nacreZ. Tang *et al.**Nature Mater.*, 2003, **2**, 413–418.

Alternate cementing layers of organic material followed by inorganic mass are supposedly behind the mechanical strength of the structural features of nacre. This paper demonstrates that sequential orderly arrangement of layers of poly-electrolytes and clays, determined by the well-established deposition technique of 'layer-by-layer assembly', can reproduce desirable structural features. The resulting nanoscale version of nacre generates unique macromolecular folding effects. Molecular processes occurring in natural biocomposites under stress can now be studied from this model replica nanoscale material made of clay and polyelectrolyte.

Artificial muscles with tactile sensitivity

T. F. Otero and M. T. Cartes

Adv. Mater., 2003, **15**, 279–282.

Muscles are natural sensors with tactile sensitivity discriminating between hard and soft surfaces. Search for a material with tactile sensitivity that can mimic natural muscles is an active topic of research. This paper reports a macroscopic electro-chemo-mechanical device with tactile sensitivity that is made of polypyrrole films.

Catalyst substrate co-immobilization: A strategy for catalyst discovery in split-and-mix librariesP. Krattinger *et al.**Angew. Chem. Int. Ed. Engl.*, 2003, **42**, 1722–1724.

Library screening is an efficient way of discovering active and specific catalysts, the approach, however, being limited by the ability to visualize reactions catalysed on a single bead containing the cognate substrate for the catalyst molecule. A general methodology is presented for screening library of catalysts for biomolecular reactions visualized by a kinetic NMR spectroscopy.

Insights into IgA-mediated immune responses from the crystal structures of**human Fc α RI and its complex with IgA1-Fc**A. B. Herr *et al.**Nature*, 2003, **423**, 614–620.

IgA is the predominant form of the immunoglobulin molecule found in the secretory response, and in the mucosal region. It appears as a monomer, or a dimer, or as a third distinct form called the secretory IgA. The immune response is elicited by an IgA-bound antigen when it interacts with the specific receptor Fc α RI. The three-dimensional structure of a human Fc α RI and another molecular complex co-crystallizing Fc α RI with its ligand, Fc region of IgA1 Fc α are described. Fc RI belongs to the immunoglobulin superfamily, consisting of two immunoglobulin-like domains. The co-crystallized ligand, Fc α , resembles the Fc regions of other immunoglobulin molecules except the location of interchain disulphide bonds and the sites of N-glycosylation. Two Fc α RI bind each Fc α dimer, the binding site overlapping with the binding site for the polymeric immunoglobulin receptor. The crystal structure described in this article can explain several functional features of the IgA1, such as lack of initiation of phagocytosis by IgA expressing cells.

A gate to organo-krypton chemistry: HKrCCHL. Khriachtchev *et al.**J. Am. Chem. Soc.*, 2003, **125**, 6876–6877.

The majority of the chemically bound rare gas atoms are xenon compounds, and only a few krypton-containing molecules are known. This paper reports the synthesis of an organo-krypton molecule, HKrCCH.

Structural evidence for substrate strain in antibody catalysisJ. Yin *et al.**Proc. Natl. Acad. Sci. USA*, 2003, **100**, 856–861.

The co-crystal structure of the Michaelis complex containing the Fab portion of ferrocatalase antibody and its substrate is described at a nominal resolution of 2.6 Å. The bound form of the substrate ligand adopts a non-planar conformation. The antibody-mediated catalysis is facilitated by forming a transition state configuration obtained by distortion in the bound substrate molecule. This paper sheds light on the molecular mechanism of antibody catalysis.