no more than 0.2 nm/min. Only $M(dag)_2$ did not give a film even at a rate much higher than 0.2 nm/s. The thicknesses of films obtained for the complexes of the other six kinds of ligands, monitored by a quartz oscillator, were ranged from 50 to 150 nm. X-ray diffraction profiles, electronic absorption spectra, ultraviolet photoemission spectra [2] and electric resistivities of the complex films were measured in most cases at room temperature to study characteristics of their structural and electronic properties.

Molecular orientations in the films have been examined to be dependent on the compound and/or deposition conditions, in particular, the substrate. For example, on a quartz-glass substrate, a $Ni(bqd)_2$ film is amorphous, while $Pd(bqd)_2$ and $Pt(bqd)_2$ films are uniaxially oriented [3]. Further, a $Pt(dmg)_2$ film is oriented with the molecular stacking axis parallel to a quartz-glass surface, whereas perpendicular to a graphite surface. The lowest electronic absorption energies, assigned to the electronic transitions from nd_z2 to $(n+1)p_z$ levels for Pd and Pt complexes in most cases, show the same order of magnitude as their threshold ionization energies from Ni to Pt complexes in most films. The $Pt(bqd)_2$ film shows the lowest value of the transition energy 0.99 eV in all the compounds measured in this work. Its threshold ionization energy 4.96 eV is as small as the lowest values ca. 4.8 eV for $Pt(niox)_2$ and $Pd(anqd)_2$ films. Thus, these data as well as the results of electric resistivity measurements lead to a conclusion that several films above can be grouped into the narrow gap semiconductors of molecular origin.

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Electrical Properties of Peptaibol-induced Ion-channels in Bilayer Lipid Membranes

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Peptaibols are antibiotic peptides, some of which produce voltage dependent ion-channels in bilayer lipid membranes (BLM). In this report we describe the electrical properties of ion-channels formed in planar bilayer lipid membranes by trichocellin and template-assembled alamethicins.

Keywords: Single-channel recording/ Template-assembled synthetic peptide/ Trichocellin/ Alamethicin

Peptaibols are a family of antibiotic peptides that contain α-aminoisobutyric acid residues and have an α-aminoalcohol at the C-terminal. Alamethicin, an extensively studied peptaibol, forms voltage-dependent ion-channels in BLM. The electrical properties of the channels are interpreted in terms of a barrel-stave model, a bundle of parallel helices spanning BLM. Studies of the ion-channels formed by peptaibols, which is much simpler in structure than ion-channel proteins, would provide useful knowledge on the relationship between the ion-channel structure and function. In this study, we focus on the electrical properties of the ion-channels formed in planar BLMs by trichocellin and template-assembled alamethicins (called ALn-cyclo2n) that have been prepared by linking n alamethicin monomers to a cyclic pseudopeptide, cyclo(Lys-mAbz)n.

Trichocellin formed ion-channels with several discrete conductance states corresponding different pore sizes. The low-conductance state channels showed nonlinear current-voltage curves, which may result from the interaction between ions and the pore wall. All the channels observed with KCl solutions were slightly cation-selective. The order of ion selectivity among alkali metal cations was Cs^+, Rb^+, K^+ > Na^+ > Li^+ with 3 M chloride salt solutions. The selectivity order is close to the mobility sequence for the ions in aqueous solution, suggesting that the channels behave as a water-filled pore and the ions pass through the channels in hydrated form.

For template-assembled peptides, it would be expected that one peptide molecule produces one ion-channel with a definite pore size and that the channel has a long open lifetime. All the tree ALn-cyclo2n peptides (n=3-5) formed long-lived channels. The unitary conductances of the AL3-cyclo6 (n=3) and AL4-cyclo8 (n=4) channels were in agreement with the lowest and the next lowest condactances of the alamethicin channel, respectively, whereas the AL5-cyclo10 channel had various conductance states. This finding may imply that the structural rigidity of the template peptides is one of the important factors in determining the ion-channel properties.